

MAMMALS

- Yellowstone is home to the largest concentration of mammals in the lower 48 states.
- 67 different mammals live here, including many small mammals.
- Several hundred grizzly bears live in the greater Yellowstone area.
- Black bears are common.
- Gray wolves were restored in 1995; >100 live in the park now.
- Wolverine and lynx, which require large expanses of undisturbed habitat, live here.
- Seven native species of ungulates—elk, mule deer, bison, moose, bighorn sheep, pronghorn, and white-tailed deer—live here, including one of the largest herds of elk in the United States.
- Non-native mountain goats have colonized the northwestern and northeastern portions of the park.

ORDER Carnivora

Habitat

Estimated Population in Park

Family Ursidae

*Black Bear (<i>Ursus americanus</i>)	forests, meadows	common
*Grizzly Bear (<i>Ursus arctos horribilis</i>)	forests, meadows	±150 in the park ±600 in Greater Yellowstone Ecosystem

Family Canidae

*Coyote (<i>Canis latrans</i>)	forests, meadows, grasslands	common
*Gray Wolf (<i>Canis lupus</i>)	forests, meadows	±120 in the park
*Fox (<i>Vulpes vulpes</i>)	meadows	common

Family Felidae

*Bobcat (<i>Lynx rufus</i>)	forests, rocky areas	may be widespread
*Cougar (<i>Puma concolor</i>)	mountains, rocky areas	14–23
*Lynx (<i>Lynx canadensis</i>)	subalpine forests	few

Family Procyonidae

Raccoon (<i>Procyon lotor</i>)	rivers, cottonwoods	rare
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Family Mustelidae

Badger (<i>Taxidea taxus</i>)	sagebrush	common
Fisher (<i>Martes pennanti</i>)	forests	rare, if present
**Marten (<i>Martes martes</i>)	coniferous forests	common
Mink (<i>Mustela vison</i>)	riparian forests	occasional
**River Otter (<i>Lutra canadensis</i>)	rivers, lakes, ponds	common
Striped Skunk (<i>Mephitis mephitis</i>)	riparian to forest	rare
**Long-tailed Weasel (<i>Mustela frenata</i>)	willows to spruce/fir forests	common
**Short-tailed Weasel (ermine) (<i>Mustela erminea</i>)	willows to spruce/fir forests	common
**Wolverine (<i>Gulo gulo</i>)	alpine, coniferous forests	rare

*indicates a species described in the species accounts that begin on page 113, following "Small Mammals."

**indicates a species described on pages 106–112 under "Small Mammals."

Species described under "Small Mammals" are alphabetized by their common name on this list.

ORDER Artiodactyla

Family Cervidae

*Elk (Wapiti) (<i>Cervus elaphus</i>)	meadows, forests	10,000–20,000 in summer
*Moose (<i>Alces alces shirasi</i>)	riparian, forests	<200
*Mule Deer (<i>Odocoileus hemionus</i>)	forests, grasslands, shrub lands	2,300–2,500
*White-tailed Deer (<i>O. virginianus</i>)	forests, grasslands, shrub lands	occasional

Family Bovidae

*Bison (<i>Bison bison</i>)	meadows, grasslands	±3,300
*Bighorn Sheep (<i>Ovis canadensis</i>)	cliffs, mountain slopes	250–275
Mountain Goat (non-native) (<i>Oreamnus americanus</i>)	alpine meadows, rocky slopes	175–225

Family Antilocapridae

*Pronghorn (<i>Antilocapra americanus</i>)	sagebrush, grasslands	±200
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ORDER Chiroptera

Family Vespertilionidae

Big Brown Bat (<i>Eptesicus fuscus</i>)	roost in buildings, other sheltered areas	common
Fringe-tailed bat (<i>Myotis thysanodes</i>)	roost in cliffs, large snags	uncommon
Hoary Bat (<i>Lasiurus cinereus</i>)	roost in trees	uncommon
Little Brown Bat (<i>M. lucifugus</i>)	roost in caves, buildings, trees	common
Long-eared Bat (<i>M. evotis</i>)	roost in cliffs, buildings	uncommon
Long-legged Bat (<i>M. volans</i>)	roost in tree cavities, cliffs, buildings	common
Silver-haired bat (<i>Lasionycteris noctivagans</i>)	roost in trees, including snags	common
Western small-footed Bat (<i>M. ciliolabrum</i>)	roost in rocky areas, caves	rare, if present
Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)	roost in caves	uncommon
Yuma Bat (<i>M. yumanensis</i>)	roost in caves, buildings, trees	rare, if present

ORDER Lagomorpha

Family Leporidae

**Snowshoe Hare (<i>Lepus americanus</i>)	forests, willows	common
White-tailed Jackrabbit (<i>Lepus townsendii</i>)	low elevation sagebrush, grasslands	common
Desert Cottontail (<i>Sylvilagus audubonii</i>)	shrub lands	common
Mountain Cottontail (<i>S. nuttallii</i>)	shrub lands	common

Family Ochotonidae

**Pika (<i>Ochotona princeps</i>)	rocky slopes	common
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ORDER Insectivora

Family Soricidae

Dusky Shrew (<i>Sorex monticolus</i>)	moist meadows, forests	common
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Masked Shrew (<i>S. cinereus</i>)	moist meadows, forests	common
Water Shrew (<i>S. palustris</i>)	moist meadows, forests	common
Preble's Shrew (<i>S. preblei</i>)	moist meadows, forests	rare, if present
Dwarf Shrew (<i>S. nanus</i>)	moist meadows, forests	rare

ORDER Rodentia

Family Castoridae

*Beaver (<i>Castor canadensis</i>)	ponds, streams	750
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Family Sciuridae

**Least Chipmunk (<i>Tamias minimus</i>)	forests	common
Uinta Chipmunk (<i>T. umbrinus</i>)	forests	common
Yellow Pine Chipmunk (<i>T. amoenus</i>)	forests	common
**Yellow-bellied Marmot (<i>Marmota flaviventris</i>)	rocky slopes	common
**Golden-mantled Ground Squirrel (<i>Spermophilus lateralis</i>)	forests, rocky slopes	common
Northern Flying Squirrel (<i>Glaucomys sabrinus</i>)	forests	occasional
**Red Squirrel (<i>Tamiasciurus hudsonicus</i>)	forests	common
**Uinta Ground Squirrel (<i>Spermophilus armatus</i>)	sagebrush, meadows	common

Family Geomyidae

**Northern Pocket Gopher (<i>Thomomys talpoides</i>)	sagebrush, meadows, forests	common
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Family Cricetidae

Deer Mouse (<i>Peromyscus maniculatus</i>)	grasslands	common
Western Jumping Mouse (<i>Zapus princeps</i>)	riparian	occasional
Muskrat (<i>Ondatra zibethicus</i>)	streams, lakes, ponds	common
Heather Vole (<i>Phenacomys intermedius</i>)	sagebrush to forests	occasional
Long-tailed Vole (<i>Microtus longicaudus</i>)	moist meadows	common
Meadow Vole (<i>M. pennsylvanicus</i>)	moist meadows	common
**Montane Vole (<i>M. montanus</i>)	moist meadows	common
Red-backed Vole (<i>Clethrionomys gapperi</i>)	dense forests	common
Water Vole (<i>M. richardsoni</i>)	riparian	occasional
Bushy-tailed Woodrat (<i>Neotoma cinerea</i>)	rocky slopes	common

Family Erethizontidae

Porcupine (<i>Erethizon dorsatum</i>)	forests, sagebrush, willows	common
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Small Mammals

Species accounts appear in alphabetical order by their common name.

Numerous small mammals live in Yellowstone National Park. The park's interpretive rangers chose the following species to describe because visitors are likely to see them or inquire about them. Descriptive photos and illustrations exist in numerous books about these species; see "For More Information" on pages 150–154 for suggested titles.

GOLDEN-MANTLED GROUND SQUIRREL *Spermophilus lateralis*



Identification

- 9–12 inches long, 7.4–11 ounces.
- Adult head and shoulders are reddish-brown, their "mantle."
- Often mistaken

for a least chipmunk (described below); distinguished by larger size, more robust body, shorter tail, and stripes that do not extend onto the sides of the head.

Habitat

- Found throughout Yellowstone at all elevations in rocky areas, edges of mountain meadows, forest openings, tundra.
- 87% of diet consists of fungi and leaves of flowering plants; other foods include buds, seeds, nuts, roots, bird eggs, insects, and carrion.
- Predators include coyotes, weasels, badgers, hawks.

Behavior

- Hibernate October to March or April.
- Breeding occurs shortly after both males and females emerge from hibernation; one litter of 5 young per year.



LEAST CHIPMUNK *Tamias minimus*

Identification

- 7.5–8.5 inches long, 1.2 ounces.
- Smallest member of the squirrel family; one of three chipmunk species in the park.

• Alternating light and dark stripes on its back and sides, outermost stripe on the sides is dark; underside tends to be white and tail has black-tipped hairs with a reddish undertone.

- Often mistaken for golden-mantled ground squirrel (described above); distinguished by smaller size, longer tail, and lateral stripes that extend onto the sides of the head.

Habitat

- Prefers sagebrush valleys, shrub communities, and forest openings.
- Eat primarily plant material, especially seeds and other fruits, but will also eat conifer seeds and some insects.
- Preyed on by various hawks and probably foxes and coyotes.

Behavior

- In Yellowstone, this species hibernates but also stores some food and probably arouses frequently during the winter.
- Breeding begins as snowmelt occurs, usually late March until mid-May; one litter of 5–6 young per year.
- Little is known about their vocalizations but they do have "chipping" (which may be an alarm) and "clucking" calls.
- Can be identified by quick darting movements and it seems to carry its tail vertically when moving.

LONG-TAILED WEASEL*Mustela frenata***Identification**

- Typical weasel shape: a very long body, short legs, pointed face, long tail.
- 13–18 inches long, 4.8–11 ounces.
- Fur is light brown above and buff to rusty orange below in summer; all white in winter, except for tail, which is black-tipped all year.
- Males 40% larger than females.

Compare to marten (below) and short-tailed weasel, page 110.

Habitat

- Found in forests, open grassy meadows and marshes, and near water.
- Eat voles, pocket gophers, mice, ground and tree squirrels, rabbits; to a lesser degree birds, eggs, snakes, frogs, and insects.

Behavior

- Breed in early July and August; one litter of 6–9 young per year.
- Solitary animals except during breeding and rearing of young.

MARTEN*Martes americana***Identification**

- 18–26 inches long, 1–3 pounds.
- Weasel family; short limbs and long bushy tail; fur varies from light to dark brown or black; irregular, buffy to bright orange throat patch.
- Smaller than a fisher; buffy or orange bib rather than white.

Compare to long-tailed weasel (above) and short-tailed weasel, page 110.

Habitat

- Found in conifer forests with understory of fallen logs and stumps; will use riparian areas, meadows, forest edges and rocky alpine areas.
- Eat primarily small mammals such as red-backed voles, red squirrels, snowshoe hares, flying squirrels, chipmunks, mice and shrews; also to a lesser extent birds and eggs, amphibians and reptiles, earthworms, insects, fruit, berries, and carrion.

Behavior

- Solitary except in breeding season (July & August); delayed implantation; 1–5 young born in mid-March to late April.
- Active throughout the year; hunts mostly on the ground.
- Rest or den in hollow trees or stumps, in ground burrows or rock piles, in excavations under tree roots.



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Small Mammals

MONTANE VOLE

Microtus montanus

Identification

- 5–7.6 inches long, 1.2–3.2 ounces.
- Brownish to grayish-brown, occasionally grizzled; ventral side is silvery gray; relatively short tail is bi-colored.

Habitat

- Found at all elevations in moist mountain meadows with abundant grass and grassy sagebrush communities; also common in riparian areas.
- Grass is their primary food.
- Probably the most important prey

species in the park; eaten by coyotes, raptors, and other animals.

Behavior

- Active year-round maintaining tunnels in the winter; also dig shallow burrows.
- Typically breed from mid-February to November; up to 4 litters of 2–10 young per year.



PIKA

Ochotona princeps

Identification

- 7–8.4 in. long, 5.3–6.2 ounces (about the size of a guinea pig).
- Tailless, gray to brown with circular ears.

Habitat

- Found on talus slopes and rock falls at nearly all elevations in the park.
- Eat plant foods such as grasses, sedges, aspen, lichen, and conifer twigs.
- Predators include coyotes, martens, and hawks.

Behavior

- Active year-round; darts around on rocks; travels through tunnels under snow.
- Breed in spring; two litters per year.
- Often heard but not seen; makes a distinct shrill whistle call or a short “mew.”
- Scent marks by frequently rubbing cheeks on rocks.
- Late summer it gathers mouthfuls of vegetation to build “haystacks” for winter food; defends haystacks vigorously.
- Haystacks often built in same place year after year; have been known to become three feet in diameter.
- Like rabbits and hares, pika eat their own feces.

**POCKET GOPHER***Thomomys talpoides***Identification**

- 6–10 inches long, 2.6–6.3 ounces.
- Very small eyes and ears; brown or tan smooth fur; short tail; long front claws for burrowing; large external pouches for carrying food.

Habitat

- Only range restriction seems to be topsoil depth, which limits burrowing.
- Preyed upon by owls, badgers, grizzly bears, coyotes, weasels, and other predators.
- Snakes, lizards, ground squirrels, deer mice, and other animals use their burrows.

- In the top 6–8 inches below the surface they forage for forbs, some grasses and underground stems, bulbs and tubers.

Behavior

- Transport food in cheek pouches to underground cache. Grizzly bears sometimes dig up these caches, including an unsuspecting gopher.
- Do not hibernate, but instead burrow into the snow; often fill tunnels with soil forming worm-like cores that remain in the spring after snow melts.
- Breed in May and April; one litter of 5 young per year.
- Burrow systems are elaborate and often bi-level; can be 400–500 feet long.
- Very territorial; only one per burrow.

RED SQUIRREL*Tamiasciurus hudsonicus***Identification**

- 11–15 inches long, 6.7–7 ounces.
- Brownish-red on its upper half; dark stripe above white ventral side; light eye ring; bushy tail.
- Quick, energetic.
- Loud, long chirp to advertise presence; much more pronounced in the fall.

Habitat

- Spruce, fir, and pine forests; young squirrels found in marginal aspen habitat.
- Eat conifer seeds, terminal buds of conifer trees, fungi, some insects; sometimes steal young birds from nests.
- Preyed on by coyotes, grizzly bears, hawks.

Behavior

- Breed February through May, typically March and April; one litter of 3–5 young.
- One of the park's most territorial animals; territorialism ensures winter food supply.
- In fall, cuts cones from trees and caches them in middens, which are used for years and can be 15 by 30 feet; grizzlies search out these middens in whitebark pine habitat to obtain the nuts.



**RIVER OTTER***Lutra canadensis***Identification**

- 40–54 inches long, 10–30 pounds.
- Sleek, cylindrical body; small head; tail nearly one third of the body and tapers to a point; feet webbed; claws short; fur is dark dense brown.
- Ears and nostrils close when underwater; whiskers aid in locating prey.

Habitat

- Most aquatic member of weasel family; generally found near water.
- Eat crayfish and fish; also frogs, turtles, sometimes young muskrats or beavers.

Behavior

- Active year-round.
- Breed in late March through April; one litter of two young per year.
- Females and offspring remain together until next litter; may temporarily join other family groups.
- Can swim underwater up to 6 miles per hour and for 2–3 minutes at a time.
- Not agile or fast on land unless they find snow or ice, then can move rapidly by alternating hops and slides; can reach speeds of 15 miles per hour.
- Mostly crepuscular but have been seen at all times of the day.
- May move long distances between water bodies.

SHORT-TAILED WEASEL (ERMINE)*Mustela erminea***Identification**

- 8–13 inches long, 2.1–7 ounces.
- Typical weasel shape: very long body, short legs, pointed face, long tail.
- Males about 40% larger than females.
- Fur is light brown above and white below in summer; all white in winter except for tail, which is black-tipped all year.

Compare to long-tailed weasel and marten, page 107.

Habitat

- Eat voles, shrews, deer mice, rabbits, rats, chipmunks, grasshoppers, and frogs.
- Found in willows and spruce forests.

**Behavior**

- Breed in early to mid-summer; 1 litter of 6–7 young per year.
- Can leap repeatedly three times their length.
- Will often move through and hunt in rodent burrows.

SNOWSHOE HARE*Lepus americanus***Identification**

- 14.5–20 inches long, 3–4 pounds.
- Large hind feet enable easy travel on snow; white winter coat offers camouflage; gray summer coat.
- Transition in seasonal fur color takes about 70–90 days; seems to be triggered in part by day length.

Habitat

- Found particularly in coniferous forests with dense understory of shrubs, riparian areas with many willows, or low areas in spruce-fir cover.
- Rarely venture from forest cover except to feed in forest openings.
- Eat plants; uses lodgepole pine in winter.

- Preyed upon by lynx, bobcats, coyotes, foxes, weasels, some hawks, and great horned owls.

Behavior

- Breed from early March to late August.
- Young are born with hair, grow rapidly and are weaned within 30 days.
- Mostly nocturnal; their presence in winter is only advertised by their abundant tracks in snow.
- Docile except during the breeding season when they chase each other, drum on the ground with the hind foot, leap into the air, and occasionally battle each other.



The white-tailed jackrabbit (Lepus townsendii) also lives in Yellowstone. In 2008, a scientist raised the alarm that these hares seemed to have disappeared from the park. Other scientists came forward with evidence of the jackrabbit's presence, and he quickly retracted his alarm.

UINTA GROUND SQUIRREL*Spermophilus armatus***Identification**

- 11–12 inches long, 7–10 ounces.
- Grayish back and rump with fine white spots on back; nose and shoulders are tan to cinnamon; tail is grayish underneath.

Habitat

- Found in disturbed or heavily grazed grasslands, sagebrush meadows, and mountain meadows up to 11,000 feet.
- Eat grasses, forbs, mushrooms, insects, and carrion (including road-killed members of its own species).
- Preyed on by long-tailed weasels, hawks, coyotes, badgers.

Behavior

- Hibernate as early as mid-July through March.
- Breed in early spring; one litter of 6–8 young per year.
- Young, after they leave the burrow, are vulnerable to long-tailed weasels and hawks.
- During cool spring weather, Uinta ground squirrels active at all times of day, as the weather warms activity more limited to morning, late afternoon, and evening.
- During winter, Uinta ground squirrels are sometimes active near the Albright Visitor Center and hotel at Mammoth Hot Springs. Perhaps they are aroused from hibernation due to ground temperatures rising as hydrothermal activity increases in the vicinity. No one knows for sure.

WOLVERINE*Gulo gulo***Identification**

- 38–47 inches long, 13–31 pounds.
- Largest member of weasel family; compact and strongly built, broad head, short legs; black to dark brown with white on chest that may extend as bands onto sides; shaggy appearance due to long guard hairs.

Habitat

- Found in high-elevation conifer forests and alpine tundra; rarely seen.
- Eat burrowing rodents, birds, eggs, beavers, squirrels, marmots, mice, and vegetation (including whitebark pine nuts); chiefly a scavenger in winter, but has also been known to take large prey such as deer or elk.

**YELLOW-BELLIED
MARMOT***Marmota flaviventris***Identification**

- 20–28 inches long; 3.5–11 pounds.
- One of the largest rodents in Yellowstone.
- Reddish-brown upper body; yellowish belly; small ears; prominent active tail.

Habitat

- Found from lowest valleys to alpine tundra, usually in open grassy communities and almost always near rocks.
- Feed on grasses and forbs in early summer; switch to seeds in late summer, occasionally will eat insects.

**Behavior**

- Active year-round, intermittently throughout the day
- Breed April to October; 1 litter of 2–4 young each year.
- Den in deep snow, under log jams and uprooted trees in avalanche chutes.
- Mostly solitary except when breeding.

Research

From 2005–2009, researchers gathered information about this species in eastern Yellowstone National Park and the adjoining Shoshone and Gallatin national forests. Animals were live-trapped and fitted with GPS collars to track their movement. Wolverines were present in the southeast corner of Yellowstone and in the Gallatin National Forest, north of the park.

- Preyed on by coyotes, grizzlies, and golden eagles.

Behavior

- Hibernate up to 8 months, emerging from February to May depending on elevation; may estivate in June in response to dry conditions and lack of green vegetation and reappear in late summer.
- Breed within two weeks of emerging from hibernation; average 5 young per year.
- Active in morning, late afternoon, and evening.
- Colonies consist of one male, several females, plus young of the year.
- Vocalizations include a loud whistle (early settlers called them “whistle pigs”), a “scream” used for fear and excitement; a quiet tooth chatter that may be a threat.
- Males are territorial; dominance and aggressiveness demonstrated by waving tail slowly back and forth.

Bear, Black



In Yellowstone, about 50 percent of black bears (*Ursus americanus*) are black in color, others are brown, blonde, and cinnamon. They stand about 3 feet high at the shoulder. Males weigh 210–315 pounds; females weigh 135–200 pounds. They have fair eyesight and an exceptional sense of smell.

Black bears eat almost anything, including grass, fruits, tree cambium, eggs, insects, fish, elk calves, and carrion. Their short, curved claws enable them to climb trees, but do not allow them to dig for roots or ants as well as a grizzly bear can. (Grizzlies have longer, less-curved claws.)

During fall and early winter, black bears spend most of their time feeding, in a pre-denning period known as “hyperphagia.” In November they locate or excavate a den on north-facing slopes between 5,800–8,600 feet. There, they hibernate until late March.

Most scientists consider bears to be true hibernators. Some hibernating animals experience an extreme drop in metabolism with a cooling of body temperature and near stoppage of respiration and circulation. Bears undergo these changes less than some other species, and they can be easily roused from hibernation.

Males and females without cubs are solitary, except during the mating season, May to early July. They may mate with a number of individuals, but occasionally a pair stays together for the entire period. Both genders usually begin breeding at age four.

After fertilization, the barely developed blastocyst (egg) does not immediately implant in the uterus, a process called “delayed implantation.” If the bear is healthy when she dens for the winter, implantation and development will begin; if not, her body will abort the blastocyst. Total gestation time is 200 to 220 days, but only during the last half of this period does fetal development occur.

As of January 2010 . . .

Number in Yellowstone
common

Where to see

Tower and Mammoth areas, most often.

Behavior & Size

- Males weigh 210–315 pounds, females weigh 135–200 pounds; adults stand about 3 feet at the shoulder.
- May live 15–30 years.
- Home range: male, 6–124 square miles, female, 2–45 square miles.
- Can climb trees; adapted to life in forest and along forest edges.
- Food includes rodents, insects, elk calves, cutthroat trout, pine nuts, grasses and other vegetation.
- Mates in spring; gives birth the following winter to 1–3 cubs.
- Considered true hibernators.

History

- Like grizzlies, used to be fed at dumps within the park.
- For years, black bears were fed by visitors from vehicles.
- Both of these actions resulted in bears losing fear of humans and pursuing human food, which resulted in visitor injuries, property damage, and the need to destroy “problem bears.”

Management Status

- 2000, study begun to find out how black bears fit into the mix of northern range predators; twelve black bears have been radio-collared.

See “Bear Management” in Chapter 8.

Birth occurs in mid-January to early February; the female becomes semiconscious during delivery. Usually two cubs are born. At birth, the cubs are blind, toothless, and almost hairless. After delivery the mother continues to sleep for another two months while the cubs suckle and sleep.

After emerging from the den, the cubs and their mother roam over her home territory. The bears have no regular summer den, but they often dig shallow depressions—day beds—near abundant food sources. In the fall, the cubs den with their mother. The following spring, the cubs and mother separate.

When faced with a threat, black bears are likely to retreat up a tree or flee, rather than reacting aggressively. However, any bear, particularly a female with cubs, may attack when surprised at close range. Black bears occasionally stalk and kill humans—although this is rare. Whether it’s a grizzly or a black bear, always give these animals a wide berth.

Bear, Grizzly



grizzlies grow larger and their claws grow longer, they have a harder time climbing. Stories that bears cannot swim or run downhill are also untrue. Grizzlies can swim, run up and

downhill, and sprint up to 40 miles per hour.

Bears are generally solitary, although they may tolerate other bears when food is plentiful. Mating season occurs from mid-May to mid-July, and bears may mate with multiple partners during a single season. Females do not breed until at least age 4 or 5. Bears experience “delayed implantation,” meaning that the embryos do not begin to develop until late November or December. This appears to be a strategy allowing the mother bear to save up energy until entering her winter den, where the cubs are born in late January or February. A litter of one to three cubs is common, litters of four cubs occur occasionally. Male bears take no part in raising cubs and may pose a threat to younger bears. A mother grizzly will usually keep her cubs with her for two winters following their birth, after which time she (or a prospective suitor) chases the subadult bears away so she can mate again. Female cubs frequently establish their home range in the vicinity of their mother, but male cubs must disperse farther in search of a home.

They can be effective predators, especially on such vulnerable prey as elk calves and spawning cutthroat trout. They also scavenge meat when available, such as from winter-killed carcasses of elk and bison, from road-killed wildlife, and from wolves and cougars. They eat small mammals (such as pocket gophers) and insects (such as ants and army cutworm moths that summer on high-elevation talus slopes), both of which

As of January 2010 . . .

Number in Yellowstone

±150 with home ranges wholly or partially in park; ±600 in Greater Yellowstone Ecosystem.

Where to see

Dawn and dusk in the Hayden and Lamar valleys, on the north slopes of Mt. Washburn, and from Fishing Bridge to the East Entrance.

Behavior & Size

- Males weigh 300–700 pounds, females weigh 200–400 pounds; adults stand about 3½ feet at the shoulder.
- May live 15–30 years.
- Home range: male, 813–2,075 square miles, female, 309–537 square miles.
- Agile; can run up to 35–40 mph.
- Can climb trees but curved claws and weight make this difficult.

- Adapted to life in forest and meadows.
- Food includes rodents, insects, elk calves, cutthroat trout, roots, pine nuts, grasses, and large mammals.
- Mates in spring; gives birth the following winter; 1–3 cubs.
- Considered true hibernators.

Status

The grizzly bear population in the Greater Yellowstone Ecosystem was returned to the federal threatened species list in 2009; this decision may be appealed.

Scientists and managers believe the grizzly population is doing well. Grizzlies are raising cubs in nearly all portions of the Greater Yellowstone area. They are also dispersing into new habitat.

Current Management

See “Bear Management” in Chapter 8.

The grizzly bear (*Ursus arctos horribilis*) is a subspecies of brown bear that once roamed the mountains and prairies of the American West. Today, the grizzly bear remains in a few isolated locations in the lower 48 states, including Yellowstone.

The name “grizzly” comes from silver-tipped or “grizzled” hairs on some animals’ coats. However, the coloration of black and grizzly bears is so variable that it is not a reliable means of telling the two species apart. Particularly when bears are not fully grown or when seen only briefly or at a long distance, it can be difficult to correctly identify one bear species from another.

It is commonly said that grizzly bears cannot climb trees. This is not true, especially when the bears are small. As

Bear, Compare

provide important, high-protein food. A grizzly's long claws and strong shoulders enable it to efficiently dig for roots, bulbs, corms, and tubers, and rodents and their caches. They also eat a wide variety of plants, including whitebark pine nuts, berries, sedges, grasses, glacier lilies, dandelions, yampas and biscuitroots, horsetails and thistles. They will eat human food and garbage where they can get it. This is why managers emphasize that keeping human foods secure from bears increases the likelihood that humans and bears can peacefully co-exist in greater Yellowstone.

Grizzlies have a social hierarchy that determines which bears dominate the best habitats and food sources:

1. adult males
2. lone adult females, females with two-year-old cubs; females with yearlings
3. females with cubs of the year
4. subadults of either sex

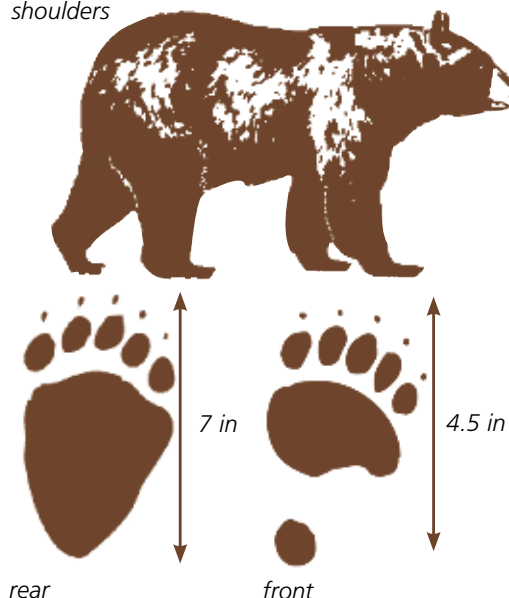
Subadult bears, who are just learning to live on their own away from mother's protection, are most likely to be living in poor-quality habitat or in areas nearer roads and developments. Thus, young adult bears are most vulnerable to danger from humans and other bears, and to being conditioned to human foods. Food-conditioned bears are removed from the wild population.

Like black bears, grizzlies spend most of their time feeding. This effort increases during "hyperphagia," the predenning period in autumn. They locate or excavate dens on densely vegetated, north-facing slopes between 6,562–10,000 feet. Grizzlies enter their winter dens between mid-October and early December. Although grizzlies are considered true hibernators (*see black bear description for more on this*), they do sometimes awaken and leave their dens during the winter.

Black Bear

rump higher than shoulders

no hump



rear

front

Grizzly Bear

rump lower than shoulders

hump present



rear

front

Beaver



As of January 2010 . . .

Number in Yellowstone

Minimum estimate: 750 in 127 colonies

Where to see

Beavers often have lodges in Willow Park (between Mammoth and Norris), Beaver Ponds (Mammoth area), Harlequin Lake (Madison area), and the Gallatin River along U.S. 191. In the backcountry, they often have lodges in the upper Yellowstone River (Thorofare region), Bechler River, and Slough Creek. They may be seen occasionally in the Lamar, Gardner, and Madison rivers.

Behavior & Size

- Active at night.
- If live on rivers, may build bank dens instead of lodges.
- One lodge may support 6–13 beavers that are usually related; this group is called a colony.
- 35–40 inches long, including tail.
- Weighs 30–60 pounds.
- Average life span: 5 years.

Other Information

- Beavers are native to Yellowstone.
- Yellowstone's beavers escaped most of the trapping that occurred in the 1800s due to the region's inaccessibility.
- The most recent survey for beavers in Yellowstone was conducted in 2007.

Since 1989, park staff has periodically surveyed riparian habitat in Yellowstone to determine current presence and distribution of beaver (*Castor canadensis*). These surveys confirmed that beavers live throughout Yellowstone National Park but are concentrated in the southeast (Yellowstone River delta area), southwest (Bechler area), and northwest portions (Madison and Gallatin rivers) of the park. They are also making a comeback in Slough Creek due to new willow growth and because they were reintroduced upstream in the Gallatin National Forest. These areas are likely important habitat because of their waterways, meadows, and the presence of preferred foods such as willow, aspen, and cottonwood.

Beavers, however, are not restricted to areas that have their preferred foods. Essentially no aspen exist in some areas where beaver sign is most abundant, such as in the Bechler River. The same is true in other areas where beavers periodically live, such as Heart Lake, the lower Lamar River and Slough Creek area, Slide Lake, and the lower Gardner River. In these areas, beavers use willows for construction and

for food. Where their preferred plants are few or absent, beavers may feed on submerged vegetation such as pond lilies.

Beavers are famous as dam builders, and examples of their work can be seen from the roads in the park. An old dam is visible at Beaver Lake between Norris and Mammoth. Most dams are on small streams where the gradient is mild, and the current is relatively placid during much of the year. Colonies located on major rivers or in areas of frequent water level fluctuations, such as the Lamar River, den in holes in the riverbank.

Male and female beavers look alike—thick brown fur, paddle-shaped tail, weigh 30–60 pounds, and are 35 to 40 inches long, including tail. When hunched over their food, beaver can resemble round rocks.

Because beavers are most active at night, visitors seldom see them. But these animals do not necessarily avoid areas of moderate to high levels of human use. Several occupied lodges in Yellowstone are close to popular backcountry trails and campsites. Every year, beavers are seen along main park roadways. The nocturnal habits of beavers seem to be enough to separate them from human use of the same area.

People who wait near known beaver activity areas may be rewarded with the sight of them swimming smoothly along or clamoring onto the bank to gnaw at trees and willows. But they may just as likely hear the sound of a startled or surprised beaver—the sharp sound of the beaver slapping its tail on the water before it submerges to seek safety.

Bighorn Sheep



Millions of bighorn sheep (*Ovis canadensis*) once lived in the western United States. By 1900, though, bighorn numbers were reduced to a few hundred due to market hunting. In 1912, naturalist Ernest T. Seton reported bighorns in the park had increased to more than 200, and travelers could find them around Mt. Everts or Mt. Washburn.

Bighorn sheep inhabit high, rocky country. The bottoms of their feet are concave, enabling them to walk and run over rocks very easily. Their tan-colored fur camouflages them against cliff rocks.

Both males and females have horns. For the first two years of its life, the horns of a male are similar to the small, slightly curved horns of a female. By the time a male is six or seven years old, the horns form the better part of a circle. The bone interior of the horn does not extend out very far; the outer parts of the horns are hollow and may be damaged during the rut (mating season). Broken or splintered tips are never replaced, and the horn continues to grow from the base throughout the animal's life.

The rut begins in November. Males challenge one another in dramatic battles, snorting and grunting and rising onto their hind legs, then racing toward each other and crashing their heads and horns together. Their extra thick skull protects their brain during these jarring encounters. At the end of the two-month rut, males are often battered and bruised.

Although they are sure-footed in a steep and rocky environment, bighorns do have accidents. They fall off cliffs, slip on ice, and can become caught in avalanches. In Yellowstone, they also have been struck by lightning and hit by automobiles.

As of January 2010 . . .

Number in Yellowstone 250–275

Where to See

- Summer: slopes of Mount Washburn, along Dunraven Pass.
- Year-round: Gardner Canyon between Mammoth and the North Entrance.

Also: On cliffs along the Yellowstone River opposite Calcite Springs; above Soda Butte; in backcountry of eastern Absarokas.

Behavior and Size

- Adult male (ram) up to 300 pounds, including horns that can weigh 40 pounds.
- Average life span: males, 9–12 years; females 10–14 years.
- Adult female (ewe) up to 200 pounds.

- Both sexes have horns.
- Feed primarily on grasses; forage on shrubby plants in fall and winter.
- Mating season begins in November.
- One to two lambs born in May or June.

Management

- Bighorns exhibit some habituation to humans; be alert to them along the road; never feed them.
- Early reports of large numbers of bighorn sheep in Yellowstone have led to speculation they were more numerous before the park was established.
- A chlamydia (pinkeye) epidemic in 1982 reduced the northern herd by 60%.
- Other unknown factors may be limiting the population now.

Population and Management

Before a chlamydia (pinkeye) epidemic in 1982, almost 500 bighorn sheep lived on the northern range. Their population dropped 60% due to the epidemic, and it has been slow to recover. Researchers recently concluded that wolf reintroduction has not affected the bighorn sheep population. Their reasoning includes the fact that the population has been increasing by seven percent annually since 1998. They conclude that other, so far unknown, factors may be limiting population growth.

Researchers have also studied bighorn sheep habitat use and the effect of human activity along the Gardiner–Mammoth road. About 65 percent of all sheep observations occur atop McMinn Bench of Mt. Everts.

Bison



As of January 2010 . . .

Number

approximately 3,300

Where to see

- Year-round: Hayden and Lamar valleys.
- Summer: grasslands of the park.
- Winter: hydrothermal areas and along the Madison River.

Behavior & Size

- Male (bull) weighs up to 2,000 pounds, female (cow) weighs up to 1,000 pounds.
- May live 12–15 years.
- Feed primarily on grasses and sedges.
- Mate in late July through August; give birth to one calf in late April or May.
- Can be aggressive, are very agile, and can run up to 30 miles per hour.
- Two subpopulations: Northern Range and Hayden Valley.

History

- Yellowstone National Park is the only place in the lower 48 states to have a continuously free-ranging bison population since prehistoric times.
- In the 1800s, market hunting, sport hunting, and the U.S. Army nearly caused the extinction of the bison.
- By 1902, poachers reduced Yellowstone's small herd to about two dozen animals.
- The U.S. Army, who administered Yellowstone then, protected these bison from further poaching.
- Bison from private herds augmented the native herd.
- For decades, bison were intensively managed due to belief that they, along with elk and pronghorn, were over-grazing the park.
- By 1968, intensive manipulative management (including herd reductions) of bison ceased.

Current Issues

See "Bison Management," in Chapter 8.

Bison are animals of the grasslands; they eat primarily grasses and sedges. Their massive hump supports strong muscles that allow the bison to use its head as a snowplow in winter, swinging side to side to sweep aside the snow.

Cows, calves, and some younger bulls comprise a herd. Mature bulls, however, spend most of the year alone or with other bulls. The exception is during the rut, or mating season. At this time, in late July and August, bulls seek out females. They display their dominance by bellowing, wallowing, and engaging in fights with other bulls. Once a bull has found a female who is close to estrus, he will stay by her side until she is ready to mate. Then he moves on to another female.

After a gestation period of 9 to 9½ months, single reddish-brown calves are born in late April and May. Calves can keep up with the herds about 2–3 hours after birth and they are well protected by their mothers and other members of the herd. However, wolves and grizzly bears have killed bison calves.

Wolves are the only large predator of adult bison. Scientists have also recently seen grizzly bears hunting bison successfully. Dead bison provide an important source of food for scavengers and other carnivores.

Many insects feed upon the bison, and bison will rub against trees, rocks, or in dirt wallows in an attempt to get rid of insect pests. Birds such as the magpie "ride" a bison to feed on insects in its coat. The cowbird will also follow close behind a bison, feeding on insects disturbed by its steps.

Migration

Like most other ungulates of the greater Yellowstone area, bison will move from their summer ranges to lower winter ranges as snow accumulates and dense snowpacks develop. When and where they migrate depends on a complex relationship between

In North America, both "bison" and "buffalo" refer to the American bison (*Bison bison*). Generally, "buffalo" is used informally; "bison" is preferred for more formal or scientific purposes.

For many years scientists considered Yellowstone's bison to be a subspecies known as the mountain bison. Today, most scientists consider all bison to be one species, *Bison bison*.

The bison is the largest land mammal in North America. Bulls are more massive in appearance than cows, and more bearded. For their size, bison are agile and quick, capable of speeds in excess of 30 mph. Each year, bison injure park visitors who approach too closely.

Bison are sexually mature at age 2. Although female bison may breed at younger ages, older males (>7 years) participate in most of the breeding. In Yellowstone, their life span averages 12–15 years; a few individuals live as long as 20 years. Both sexes have horns, those of the cow being slightly more curved and slender than the bull's.

abundance of bison, quality of summer forage, and winter snow pack. However, observations of bison movement patterns show that a large number of the central herd migrate north in winter. Bison remain along the west boundary well into birthing season. Research also shows that although bison travel on groomed roads, they select these routes because they follow stream courses that connect larger patches of habitat. (See map at right.)

History

From 30 to 60 million bison may have roamed North America before the mid 1800s. Their historic range spread from the Pacific to the Appalachians, but their main habitat was the Great Plains where Plains tribes developed a culture that depended on bison. Almost all parts of the bison provided something for the Native American way of life—food, tools, shelter, or clothing; even the dung was burned for fuel. Hunting bison required skill and cooperation to herd and capture the animals. After tribes acquired horses in the 1600s, they could travel farther to find bison and hunt the animals more easily.

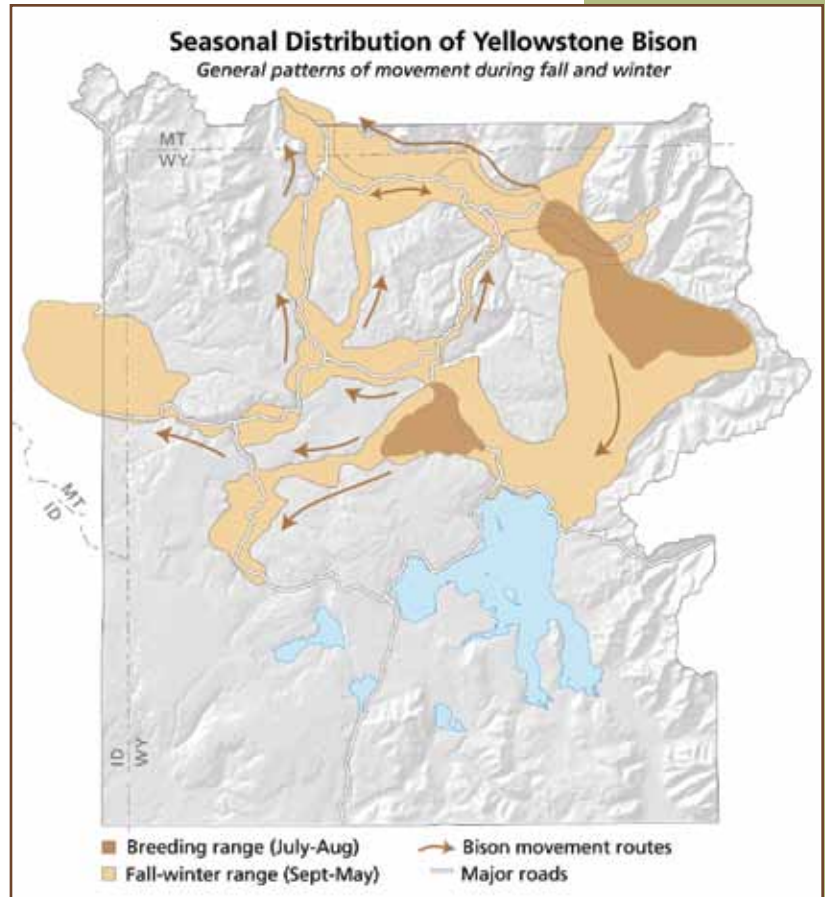
European American settlers moving west during the 1800s changed the balance. Market hunting, sport hunting, and a U.S. Army campaign in the late 1800s nearly eliminated bison. Yellowstone was the only place in the contiguous 48 states where wild, free-ranging bison persisted. The U.S. Army, which administered Yellowstone at that time, protected these few dozen bison from poaching as best they could. The protection and recovery of bison in Yellowstone is one of the great triumphs of American conservation. (See Chapter 1.)

Managing Bison

Despite protection, Yellowstone's bison were reduced by poaching to less than two dozen animals in 1902. Fearing the demise of the wild herd, the U.S. Army brought 21 bison from ranches to Yellowstone. In 1906–07, the Buffalo Ranch in Lamar Valley was constructed to manage these bison and increase their numbers. This herd grew to more than 1,000 animals; the park's small native bison herd in Pelican Valley also slowly increased. In the 1930s, the introduced bison were allowed to move freely and intermingle with the native bison. The park's bison population was close to 1,500 in

1954, and managers became concerned that bison would overgraze their habitat—so they began culling the animals. By March 1967, the herd was down to 400.

In 1968, managers stopped manipulating bison populations and allowed natural ecological processes to operate. As their population grew, bison began to move



outside the park. Conflicts with humans began to occur. Bison can be a threat to human safety and can damage fences, crops, landscaping, and other private property. And, of significant concern to livestock producers, some Yellowstone bison are infected with the disease brucellosis.

Because of brucellosis, bison generally are not welcome outside the park even though other ungulates that may also harbor the brucellosis organism are. Since the 1980s, this issue has grown steadily into one of the most heated and complex of Yellowstone's resource issues. *For more information about brucellosis and bison management, see Chapter 8, "Bison Management."*

Cats: Bobcat & Lynx

The cats of Yellowstone are seldom seen and little known. Of the three living in the park, cougars are better studied and are discussed in their own section. The little information available on bobcats and lynx is summarized below.



Bobcat *Lynx rufus*

Number in Yellowstone

Unknown, but generally widespread.

Where to see

- Rarely seen; most reports from rocky areas and near rivers.
- Typical habitat: rocky areas, conifer forests.

Behavior and Size

- Adult: 15–30 pounds; 31–34 inches long.

- Color ranges from red-brown fur with indistinct markings to light buff with dark spotting; short tail; ear tufts.
- Distinguish from lynx: has several black rings that do not fully circle the tail; no black tip on tail, shorter ear tufts, smaller track (2").
- Solitary, active between sunset and sunrise.
- Eats rabbits, hares, voles, mice, red squirrels, wrens, sparrows, grouse; may take deer and adult pronghorn.

Lynx

Lynx canadensis

Number in Yellowstone

Few; 111 known observations in entire park history.

Where to see

- Very rarely seen.
- Typical habitat: cold conifer forests.

Behavior and Size

- Adult: 16–35 pounds, 26–33 inches long.
- Gray brown fur with white, buff, brown on throat

and ruff; tufted ears; short tail; hind legs longer than front.

- Distinguish from bobcat: black rings on tail are complete; tail tip solid black; longer

ear tufts; larger track.

- Wide paws with fur in and around pads; allows lynx to run across snow.
- Track: 4–5 inches.
- Solitary, diurnal and nocturnal.
- Eats primarily snowshoe hares, especially in winter; also rodents, rabbits, birds, red squirrels, and other small mammals, particularly in summer.

Research

After a four-year research project to document the number and distribution of lynx in the park, completed in 2004, researchers confirmed lynx existed and reproduced in the central and eastern portions of the park.

In December 2007, Fred Paulsen, a Xanterra employee in Yellowstone, photographed this lynx along the Gibbon River.





The cougar (*Puma concolor*), also called the mountain lion, is among the largest cats in North America. (The jaguar, which occurs in New Mexico and Arizona, is larger.) Cougars live throughout the park in summer, but few people ever see them. The northern range of Yellowstone is prime habitat for cougars because snowfall is light and prey always available. Cougars follow their main prey as they move to higher elevations in summer and lower elevations in the winter.

Adult male cougars are territorial and may kill other adult males in their home range. Male territories may overlap with several females. In non-hunted populations, such as in Yellowstone, the resident adult males living in an area the longest are the dominant males. These males sire most of the litters within a population; males not established in the same area have little opportunity for breeding.

Although cougars may breed and have kittens at any time of year, most populations have a peak breeding and birthing season. In Yellowstone, males and females breed primarily February through May. Males and females without kittens search for one another by moving throughout their home ranges and communicating through visual and scent markers called scrapes. A female's scrape conveys her reproductive status. A male's scrape advertises his presence to females and warns other males that an area is occupied. After breeding, the males leave the female.

As of January 2010 . . .

Number in Yellowstone

14–23 resident adults on the northern range; others in park seasonally.

Where to see

Seldom seen.

Behavior and size

- Adult males weigh 140–165 pounds; females weigh about 100 pounds; length, including tail, 6.5–7.5 feet.
- Average life span: males, 8–10 years; females, 12–14 years.
- Preferred terrain: rocky breaks and forested areas that provide cover for hunting prey and for escape from competitors such as wolves and bears.
- Prey primarily on elk and mule deer, plus porcupines and other

small mammals.

- Bears frequently displace cougars from their kills.
- Male cougars may kill other male cougars within their territory.
- Adult cougars and kittens have been killed by wolves.
- Litters range from 2–3 kittens; 50% survive first year.

Interaction with humans

- Very few documented confrontations between cougars & humans have occurred in Yellowstone.
- If a big cat is close by: Stay in a group; carry small children; make noise. Do not run, do not bend down to pick up sticks. Act dominant—stare in the cat's eyes and show your teeth while making noise.

In Yellowstone, most kittens are born June through September. Female cougars den in a secure area with ample rock and/or vegetative cover. Kittens are about one pound at birth and gain about one pound per week for the first 8–10 weeks. During this time, they remain at the den while the mother makes short hunting trips and then returns to nurse her kittens. When the kittens are 8–10 weeks old, the female begins to hunt over a larger area. After making a kill, she moves the kittens to the kill. Before hunting again, she stashes the kittens. Kittens are rarely involved in killing until after their first year.

Most kittens leave their area of birth at 14 to

7A

Cougar



Between 1998 and 2005, researchers documented 473 known or probable cougar kills, which included:

345 elk
64 mule deer
12 bighorn sheep
10 pronghorn
10 coyotes
7 marmots
5 porcupines
1 red fox
1 mountain goat
1 blue grouse
1 golden eagle

Cougars also killed six of their own kind, but few were eaten.

18 months of age. Approximately 99 percent of young males disperse 50 to 400 miles; about 70–80 percent of young females disperse 20 to 150 miles. The remaining proportion of males and females establish living areas near where they were born. Therefore, most resident adult males in Yellowstone are immigrants from other areas, thus maintaining genetic variability



This cougar kitten was photographed by researchers under controlled research conditions.

across a wide geographic area.

Yellowstone's cougars are not hunted within the park. Thus, their life span may be 12–14 years for females and 8–10 years for males. Cougars living in areas where they are hunted have much shorter life spans.

In Yellowstone, cougars prey upon elk (mostly calves) and deer. They stalk the animal then attack, aiming for the animal's back and killing it with a bite to the base of the skull or the throat area.

A cougar eats until full, then caches the carcass for later meals. Cougars spend an average of 3–4 days consuming an elk or deer and 4–5 days hunting for the next meal. Cougars catch other animals—including red squirrels, porcupines, marmots, grouse, and moose—if the opportunity arises.

Cougars are solitary hunters who face competition for their kills from other large mammals. Even though a cached carcass is harder to detect, scavengers and competitors such as bears and wolves sometimes find it. In Yellowstone, black and grizzly bears will take over a cougar's kill. Coyotes will try, but can be killed by the cougar instead. Wolves displace cougars from approximately 6 percent of their elk carcasses.

Management History

In the early 1900s, cougars were killed as part of predator control in the park. By 1925, very few individuals remained. However, cougar sightings in Yellowstone have increased dramatically since the mid 20th century.

In 1987, the first cougar ecology study began in Yellowstone National Park. The research documented population dynamics of cougars in the northern Yellowstone ecosystem inside and outside the park boundary, determined home ranges and habitat requirements, and assessed the role of cougars as a predator.

In 1998, the second phase of research began. Researchers collared 87 cougars, including 50 kittens in 22 litters. Between 1998 and 2005, researchers documented 473 known or probable cougar kills. Elk comprised 74 percent—52 percent calves, 36 percent cows, 9 percent bulls, 3 percent unknown sex or age. Cougars killed about one elk or deer every 9.4 days and spent almost 4 days at each kill. The study also documented that wolves detected and may have scavenged 22.5 percent of cougar-killed ungulates. This cougar monitoring study ended in 2006.

Very few cougar/human confrontations have occurred in Yellowstone. However, observations of cougars, particularly those close to areas of human use or residence, should be reported.

Coyote



wolf

coyote

Coyotes (*Canis latrans*) are intelligent and adaptable. Like wolves, they were perceived as threats to the survival of elk and other ungulates in the park's early days. Unlike wolves, however, coyotes successfully resisted extermination. Since then, research has shown coyotes eat mainly voles, mice, rabbits, other small animals, and carrion—and only the very young elk calves in the spring.

Often mistaken for a wolf, the coyote is about one-third the wolf's size with a slighter build. Its coat colors range from tan to buff, sometimes gray, and with some orange on its tail and ears. Males are slightly larger than females.

During the 20th century, coyotes partially filled the niche left vacant after wolves were exterminated from the park. In Yellowstone, they live in packs or family groups of up to 7 animals, with an alpha male and female, and subordinate individuals (usually pups from previous litters). This social organization is characteristic of coyotes living in areas free from human hunting.

Coyotes, also known as 'song dogs', communicate with each other by a variety of long-range vocalizations. You may hear groups or lone animals howling, especially during dawn and dusk periods. Coyotes also use scent-marks (urine and feces) to communicate their location, breeding status, and territorial boundaries.

Until 1995, coyotes faced few predators in Yellowstone other than cougars, who will kill coyotes feeding on cougar kills. After wolves were restored, however, dozens of coyote pups and adults were been killed by wolves—primarily when feeding on other animals killed by wolves. On the northern range, wolves caused a 30–50 percent reduction in coyote population density through direct mortality and changes in coyote denning behaviors and success. Researchers see some evidence now that coyotes on the

As of January 2010 . . .

Number in Yellowstone

Total unknown, but numerous. In the northern range, the coyote population decreased 30–50% after wolves were restored, but their population seems to have recovered.

Where to see

Meadows, fields, other grasslands, and foraging for small mammals along roadways.

Behavior & Size

- Weigh 25–35 pounds, 16–20 inches high at the shoulder.
- Average life span 6 years; up to 13 years in the park.
- Home range: 3–15 square miles.
- Primarily eat rodents, birds, insects, carrion, elk calves, some adult elk.
- 4–8 pups are born in April in dens; emerge in May.
- Killed by wolves, mountain lions.

Management

- Like other predators, coyotes were often destroyed in the early part of the 20th century because they sometimes preyed on livestock.
- Coyotes continued to thrive because their adaptability enabled them to compensate for the destruction efforts.
- Elimination of wolves probably resulted in high coyote population densities; wolves' absence opened a niche that coyotes could partially occupy in Yellowstone.
- NPS staff monitors coyotes and uses cracker-shell rounds, pepper spray, or other negative stimuli to discourage coyotes that have lost their wariness of humans.

northern range have adapted to wolves and their population has recovered.

Coyotes also face threats from humans. They quickly learn habits like roadside feeding. This may lead to aggressive behavior toward humans and can increase the risk of the coyote being hit by a vehicle. Several instances of coyote aggression toward humans have occurred here, including a few attacks.

Park staff scare unwary coyotes from visitor-use areas with cracker-shell rounds, bear repellent spray, or other negative stimuli. Animals that continue to pose a threat to themselves or to humans are killed. Signs, interpretive brochures, and park staff continue to remind visitors that coyotes and other park wildlife are wild and potentially dangerous and should never be fed or approached.

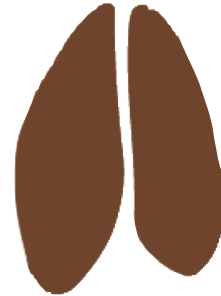


7A

Deer

Mule deer and white-tailed deer can be told apart by their coloration, antler shape, tail, behavior, and where they live. All species of deer use their hearing, smell, and sight to detect predators such as coyotes or cougars. They probably smell or hear the approaching predator first; then may raise their heads high and stare hard, rotating ears forward to hear better. If a deer hears or sees movement, it flees.

Mule deer are common in Yellowstone, living throughout the park in almost all habitats; white-tailed deer are uncommon, restricted to streamside areas of the northern range.



Mule deer *Odocoileus hemionus*

Number in Yellowstone

Summer: 2,300–2,500

Winter: less than 100

Where to see

- Summer: throughout the park.
- Winter: North Entrance area.

Behavior and Size

- Male (buck): 150–250 pounds; female (doe): 100–175 pounds; 3½ feet at the shoulder.
- Summer coat: reddish; winter coat: gray-brown; white rump patch with black-tipped tail; brown patch on forehead; large ears.

- Males grow antlers from April or May until August or September; shed them in late winter and spring.
- Mating season (rut) in November and December; fawns born late May to early August.
- Lives in brushy areas, coniferous forests, grasslands.
- Bounding gait, when four feet leave the ground, enables it to move more quickly through shrubs and rock fields.
- Eats shrubs, forbs, grasses; conifers in spring.
- Predators include wolf, coyote, cougar, bear.

White-tailed Deer *O. virginianus*

Number in Yellowstone

Scarce

Where to see

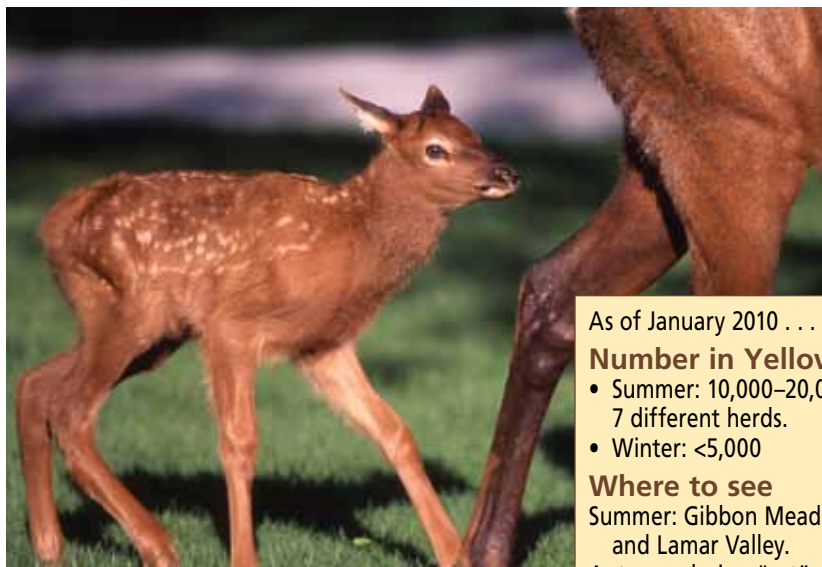
Along streams and rivers in northern part of the park.

Behavior and Size

- Adults 150–250 pounds; 3½ feet at the shoulder.
- Summer coat: red-brown; winter coat: gray-brown; throat and inside ears with

whitish patches; belly, inner thighs, and underside of tail white.

- Waves tail like a white flag when fleeing.
- Males grow antlers from May until August; shed them in early to late spring.
- Mating season (rut) peaks in November; fawns born usually in late May or June.
- Eats shrubs, forbs, grasses; conifers in spring.
- Predators include wolf, coyote, cougar, bear.



Elk (*Cervus elaphus*) are the most abundant large mammal found in Yellowstone. European American settlers used the word “elk” to describe the animal, which is the word used in Europe for moose (causing great confusion for European visitors). The Shawnee word “wapiti,” which means “white deer” or “white-rumped deer,” is another name for elk. The North American elk is considered the same species as the red deer of Europe.

Bull elk are probably the most photographed animals in Yellowstone, due to their huge antlers. Bull elk begin growing their first set of antlers when they are about one year old. Antler growth is triggered in spring by a combination of two factors: a depression of testosterone levels and lengthening daylight. The first result of this change is the casting or shedding of the previous year’s “rack.” Most bulls drop their antlers in March and April. New growth begins soon after.

Growing antlers are covered with a thick, fuzzy coating of skin commonly referred to as “velvet.” Blood flowing in the skin deposits calcium that makes the antler. Usually around early August, further hormonal changes signal the end of antler growth, and the bull begins scraping the velvet off, polishing and sharpening the antlers in the process.

The antler growing period is shortest for yearling bulls (about 90 days) and longest for healthy, mature bulls (about 140 days).

As of January 2010 . . .

Number in Yellowstone

- Summer: 10,000–20,000 elk in 6 to 7 different herds.
- Winter: <5,000

Where to see

Summer: Gibbon Meadows, Elk Park, and Lamar Valley.

Autumn, during “rut” or mating season: northern range, including Mammoth Hot Springs; Madison River.

Winter: migrate south to the Jackson Hole Elk Refuge in Jackson, Wyoming, or north to the northern range and around Gardiner, Montana; <100 year-round along the Firehole and Madison rivers.

Behavior and Size

- Male (bull) weighs about 700 pounds and is about 5 feet high at the shoulder; female (cow) weighs about 500 pounds and is

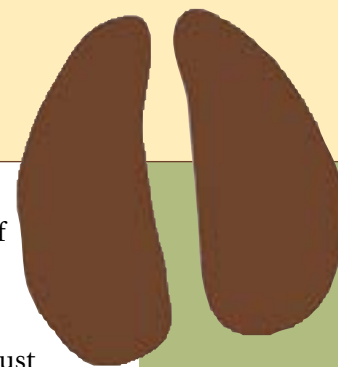
slightly shorter; calf is about 30 pounds at birth.

- Average life span: 13–18 years.
- Bulls have antlers, which begin growing in the spring and usually drop in March or April.
- Feed on grasses, sedges, other herbs and shrubs, bark of aspen trees, conifer needles, burned bark, aquatic plants.
- Mating season (rut) in September and October; calves born in May to late June.

See article on the northern range, Chapter 8.

Roughly 70 percent of the antler growth takes place in the last half of the period, when the antlers of a mature bull will grow $\frac{2}{3}$ of an inch each day. The antlers of a typical healthy bull are 55–60 inches long, just under six feet wide, and weigh about 30 pounds per pair.

Bulls retain their antlers through the winter. When antlered, bulls usually settle disputes by wrestling with their antlers. When antlerless, they use their front hooves (as cows do), which is more likely to result in injury to one of the combatants. Because bulls spend the winter with other bulls or with gender-mixed herds, retaining antlers means fewer injuries sustained overall. Also, bulls with large antlers that are retained longer are at the top of elk social structure, allowing them preferential access to feeding sites.



Elk

Antler Details

- Are usually symmetrical.
- The average, healthy, mature bull has 6 tines on each antler, and is known as a “six point” or “six by six.”
- Can occur on female elk.
- One-year-old bulls grow 10–20 inch spikes, sometimes forked.
- Two-year-old bulls usually have slender antlers with 4 to 5 points.
- Three-year-old bulls have thicker antlers.
- Four-year-old and older bulls typically have 6 points; antlers are thicker and longer each year.
- Eleven- or twelve-year old bulls often grow the heaviest antlers; after that age, the size of antlers generally diminishes.

**Mating Season**

The mating season (rut) generally occurs from early September to mid-October. Elk gather in mixed herds—lots of females and calves, with a few bulls nearby. Bulls bugle to announce their availability and fitness to females and to warn and challenge other bulls. When answered, bulls move toward one another and sometimes engage in battle for access to the cows. They crash their antlers together, push each other intensely, and wrestle for dominance. While loud and extremely strenuous, fights rarely cause serious injury. The weaker bull ultimately gives up and wanders off.

Calves are born in May and June. They are brown with white spots and have little scent, providing them with good camouflage from predators. They can walk within an hour of birth, but they spend much of their first week to ten days bedded down between nursings. Soon thereafter they begin grazing with their mothers, and join a herd of other cows and calves. Up to two-thirds of each year's calves may be killed by predators. Elk calves are food for black and grizzly bears, wolves, coyotes, cougars, and

golden eagles. Female elk can live 17–18 years; rare individuals may live 22 years.

Habitat

Climate is an important factor affecting the size and distribution of elk herds here.

While nearly the entire park provides summer habitat for 10,000–20,000 elk, winter snowfalls force elk and other ungulates to leave most of the high elevation grasslands of the park. Less than 5,000 elk winter in the park.

The northern range, with more moderate temperatures and less snowfall than the park interior, can support large numbers of wintering elk. The northern Yellowstone herd is one of the largest herds of elk in the United States. The herd winters in the area of the Lamar and Yellowstone river valleys from Soda Butte to Gardiner, Montana. It also migrates outside of the park into the Gallatin National Forest and onto private lands.

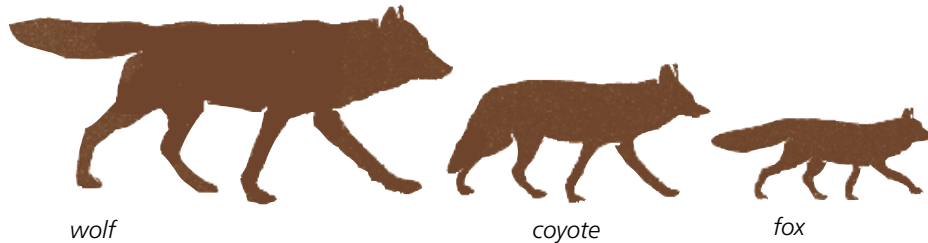
Only one herd lives both winter and summer inside the park. The Madison–Firehole elk herd (less than 100 animals) has been the focus of a research study since November 1991. Researchers are examining how environmental variability effects ungulate reproduction and survival. Prior to wolf restoration, the population was naturally regulated by severe winter conditions to a degree not found in other, human-hunted elk herds. The elk are also affected by high fluoride and silica levels in the water and plants they eat, which affect enamel formation and wear out teeth quickly—thus shortening their lives. The average life span is 13 years; elk on the northern range live approximately 18 years. Information gained in this study will be useful in comparing un hunted and hunted elk populations.

Researchers also examined elk use of areas burned in the wildfires of 1988. They found that elk ate the bark of burned trees. Fires had altered the chemical composition of lodgepole pine bark, making it more digestible and of higher protein content than live bark. While the burned bark was not the highest quality forage for elk, it is comparable to other low-quality browse species. Researchers speculate that elk selected burned bark because it was readily available above the snow cover in winter.

For management history of elk, see Chapter 8, “Northern Range.”

Horns vs. Antlers

Antlers, found on members of the deer family, grow as an extension of the animal's skull. They are true bone, are a single structure, and, generally, are found only on males. Horns, found on pronghorn, bighorn sheep, and bison, are a two-part structure. An interior portion of bone (an extension of the skull) is covered by an exterior sheath grown by specialized hair follicles (similar to human fingernails). Antlers are shed and regrown yearly while horns are never shed and continue to grow throughout an animal's life. One exception is the pronghorn, which sheds and regrows its horn sheath each year.



The red fox (*Vulpes vulpes*) has been documented in Yellowstone since the 1880s. In relation to other canids in the park, red foxes are the smallest. Adult foxes weigh 9–12 pounds; coyotes average 28 pounds in Yellowstone; and adult wolves weigh closer to 100 pounds. Red foxes occur in several color phases, but they are usually distinguished from coyotes by their reddish yellow coat that is somewhat darker on the back and shoulders, with black “socks” on their lower legs. “Cross” phases of the red fox (a dark cross on their shoulders) have been reported a few times in recent years near Canyon and Lamar Valley. Also, a lighter-colored red fox has been seen at higher elevations.

Foxes feed on a wide variety of animal and plant materials. Small mammals such as mice and voles, rabbits, and insects comprise the bulk of their diet. Carrion seems to be an important winter food source in some areas. The many miles of forest edge and extensive semi-open and canyon areas of the park seem to offer suitable habitat and food for foxes. They are widespread throughout the northern part of the park with somewhat patchy distribution elsewhere in the park. Foxes are more abundant than were previously thought in Yellowstone, yet they are not often seen because they are nocturnal, usually forage alone, and travel along edges of meadows and forests. During winter, foxes may increase their activity around dawn and dusk, and even sometimes in broad daylight. In late April and May, when females are nursing kits at their dens, they are sometimes more visible during daylight hours, foraging busily to get enough food for their growing offspring.

Foxes can become habituated to humans usually due to being fed. One fox in the summer of 1997 was trapped and relocated three times from the Tower Fall parking area because visitors fed it human food.

As of January 2010 . . .

Number in Yellowstone

Total unknown, but not nearly as numerous as coyotes.

Where to see

- Lamar and Hayden valleys, Canyon Village area.
- Typical habitat: edges of sage-brush/grassland and within forests.

Behavior and Size

- Adult males weigh 11–12 pounds; females weigh average 10 pounds.
- Average 43 inches long.
- Average life span: 3–7 years; up to 11 years in Yellowstone.
- In northern range, home range

averages 3.75 square miles, with males having slightly larger range than females.

- Several color phases; usually red fur with white-tipped tail, dark legs; slender, long snout.
- Barks; rarely howls or sings.
- Distinguish from coyote by size, color, and bushier tail.
- Solitary, in mated pairs, or with female from previous litter.
- Prey: voles, mice, rabbits, birds, amphibians, other small animals.
- Other food: carrion and some plants.
- Killed by coyotes, wolves, mountain lions.



The fox was relocated between 10 and 60 miles away from Tower but twice it returned. Finally the fox came to Mammoth where it was fed again and as a result was destroyed. While this story gives us interesting information about the homing instinct of fox, it also points out the importance of obeying rules to avoid inadvertently causing the death of one of Yellowstone's animals.

A little known fact about red foxes is most of them in the lower 48 states, especially in

7A

Fox

the eastern and plains states, were introduced from Europe in the 18th and 19th centuries for fox hunts and fur farms. The foxes that survived the hunt or escaped the fur farms proliferated and headed westward. In addition to this introduced subspecies of red fox, three native subspecies exist at high elevations in the Sierra (*V. v. nectar*), Cascade (*V. v. cascadenis*), and Rocky (*V. v. macroura*) mountains and are collectively called mountain foxes. (Yellowstone's fox is *V. v. macroura*.) Little is known about any of these subspecies.

A research project conducted between 1994–1998 determined at least two subpopulations of foxes live in the Greater Yellowstone Ecosystem. At about 7,000 feet in elevation, there seemed to be a dividing line with no geographical barriers separating these foxes. The genetic difference between these foxes was similar to mainland and island populations of foxes in Australia and their habitat use was different as well. In addition, their actual dimensions, such as ear length and hind foot length, were adapted to some degree for colder environments with deep snow and long winters.

Ever since red fox sightings were first recorded in Yellowstone National Park, a novel coat color has been seen at higher elevations. This yellowish or cream color most often occurs above 7,000 feet in areas such

as Cooke City and the Beartooth Plateau. Recent genetic analyses are beginning to shed light on this mysterious 'Yellow fox of the Yellowstone,' and new evidence is beginning to support the distinctiveness of this high elevation fox.

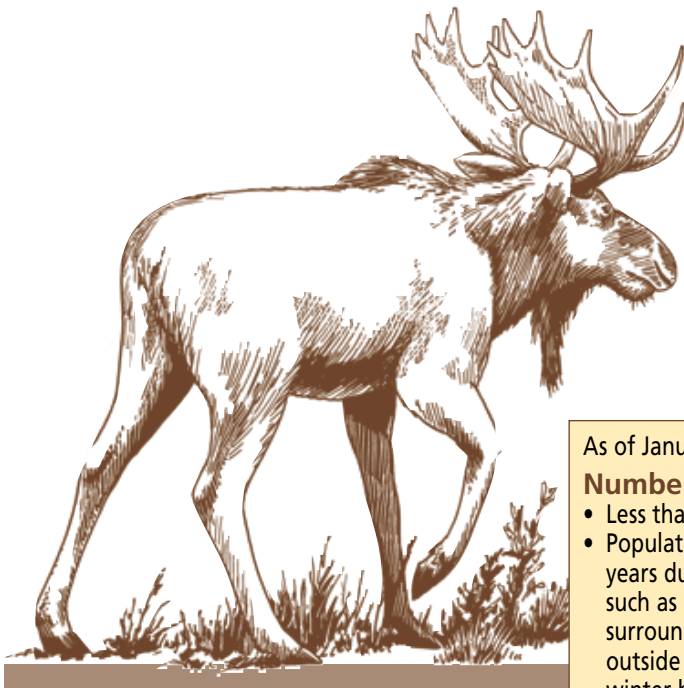
During the past century, especially within the past few decades, the number of fox sightings has increased greatly. This could be due to better documentation of sightings through the rare animal sighting reports that began in 1986. In addition, an increase in visitors means more chances to see foxes. There may also be a gradual increase in the number of foxes now that the wolf has returned to Yellowstone.

Wolves and coyotes are more closely related both genetically and physically than wolves and foxes, and wolves are successfully competing with coyotes, causing a decline in the coyote population. This may have caused an increase in the number of fox sightings in core wolf areas such as the Lamar Valley.

Recent research shows that red fox are more nocturnal than coyotes, and strongly prefer forested habitats, while coyotes tend to use sagebrush and open meadow areas. In this way, potential competition between fox and coyotes is minimized. Fox don't seem to actively avoid coyotes during an average day, they just stick with forested habitat, sleep when coyotes are most active, and then forage opportunistically. Fox will visit carcasses (like wolf kills) for the occasional big meal, especially during winter, but this is more rare than the scavenging coyotes that park visitors can expect to see on many days, especially during winter.



Moose



Moose (*Alces alces shirasi*) are the largest members of the deer family in Yellowstone. A male (bull) moose can weigh nearly 1,000 pounds and stand more than 7 feet at the shoulder. Both sexes have long legs that enable them to wade into rivers and through deep snow, to swim, and to run fast. Despite its size, a moose can slip through the woods without a sound. Moose, especially cows with calves, are unpredictable and have chased people in the park.

Both sexes are dark brown, often with tan legs and muzzle. Bulls can be distinguished from cows by their antlers. Adults of both sexes have “bells”—a pendulous dewlap of skin and hair that dangles from the throat and has no known function.

In summer, moose eat aquatic plants like water lilies, duckweed, and burweed. But the principle staples of the moose diet are the leaves and twigs of the willow, followed by other woody browse species such as gooseberry and buffaloberry. An adult moose consumes approximately 10–12 pounds of food per day in the winter and approximately 22–26 pounds of food per day in the summer.

Some moose that summer in the park migrate in winter to lower elevations west and south of Yellowstone where willow remains exposed above the snow. But many moose move to higher elevations (as high as 8,500 feet) to winter in mature stands of

As of January 2010 . . .

Number in Yellowstone

- Less than 200.
- Population has declined in last 40 years due to a number of factors such as loss of old growth forests surrounding the park, hunting outside the park, burning of winter habitat (spruce-fir forests) in 1988, and predators.

Where to see

Marshy areas of meadows, lake shores, and along rivers.

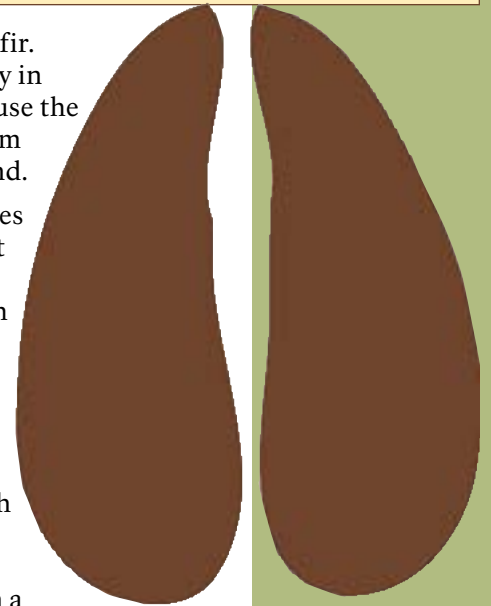
Behavior & Size

- Largest member of deer family.
- Adult male (bull) weighs close to 1,000 pounds; female (cow) weighs up to 900 pounds; 5½ to 7½ feet at the shoulder.
- Browses on willows and aquatic plants in summer; willows where available in winter or on conifers as high as 8,500 feet.
- Usually alone or in small family groups.
- Mating season peaks in late September and early October; one or two calves born in late May or June.
- Lives up to 20 years.

subalpine fir and Douglas-fir. Moose can also move easily in these thick fir stands because the branches prevent snow from accumulating on the ground.

Moose are solitary creatures for most of the year, except during the mating season or rut. During the rut, both bulls and cows are vocal: the cows may be heard grunting in search of a mate, and bulls challenge one another with low croaks before clashing with their antlers. A bull on the offensive tries to knock its opponent sideways. If such a move is successful, the challenger follows through with another thrust of its antlers. The weaker animal usually gives up before any serious damage is done; occasionally the opponent's antlers inflict a mortal wound.

Bulls usually shed their antlers in late November or December, although young bulls may retain their antlers as late as





March. Shedding their heavy antlers helps them conserve energy and promotes easier winter survival. In April or May, bulls begin to grow new antlers. Small bumps on each side of the forehead start to swell, then enlarge until they are knobs covered with a black fuzz (called velvet) and fed by blood that flows through a network of veins. Finally the knobs change into antlers and grow until August. The antlers are flat and palmate (shaped like a hand). Yearlings grow six to eight inch spikes; prime adult bulls usually grow the largest antlers—as wide as 5 feet from tip to tip. Then the bull rubs and polishes his antlers on small trees in preparation for the rut.

Cows are pregnant through the winter; gestation is approximately eight months. When ready to give birth, the cow drives off any previous year's offspring that may have wintered with her and seeks out a thicket. She gives birth to one or more calves, each weighing 25–35 pounds.

A calf walks a few hours after birth and stays close to its mother. Even so, a moose calf often becomes prey for bears or wolves and less frequently for cougars or coyotes.

History

Moose were reportedly very rare in north-west Wyoming when the park was established in 1872. Subsequent protection from hunting and wolf control programs may have contributed to increased numbers. However, forest fire suppression probably was the most important factor in their population increase because moose depend on mature fir forests for winter survival. By the 1970s, an estimated 1,000 moose inhabited the park.

The moose population declined following the fires of 1988. Many old moose died during the winter of 1988–89, probably as a combined result of the loss of good moose forage and a harsh winter. Unlike moose habitat elsewhere, northern Yellowstone does not have woody browse species that will come in quickly after a fire and extend above the snowpack to provide winter food. Therefore, the overall effect of the fires was probably detrimental to moose populations. Their current population and distribution are unknown.

Today, moose are most likely seen in the park's southwestern corner and in the Soda Butte Creek, Pelican Creek, Lewis River, and Gallatin River drainages.

The North American pronghorn (*Antilocapra americana*) is not a true antelope, which are found in Africa and south-east Asia. The pronghorn is the surviving member of a group of animals that evolved in North America during the past 20 million years. Use of the term “antelope” seems to have originated when the first written description of the animal was made during the 1804–1806 Lewis and Clark Expedition.

The pronghorn has true horns, similar to bison and bighorn sheep. The horns are made of modified, fused hair that grows over permanent bony cores, but they differ from those of other horned animals in two major ways: the sheaths are shed and grown every year and they are pronged. (A number of other horned mammals occasionally shed their horns, but not annually.) Adult males (bucks) typically have 10–16 inch horns that are curved at the tips. About 70 percent of the females (does) also have horns, but they average 1–2 inches long and are not pronged. The males usually shed the horny sheaths in November or December and begin growing the next year’s set in February or March. The horns reach maximum development in August or September. Females shed and regrow their horns at various times.

Pronghorn are easy to distinguish from the park’s other ungulates. Their deer-like bodies are reddish-tan on the back and white underneath, with a large white rump patch. Their eyes are very large, which provides a large field of vision. Males also have a black cheek patch.

Females that bred the previous fall commonly deliver a set of twins in May or June. The newborn fawns are a uniform grayish-brown and weigh 6–9 pounds. They can walk within 30 minutes of birth and are capable of outrunning a human in a couple of days. The young normally stay hidden in the vegetation while the mother grazes close by. After the fawns turn three weeks old

As of January 2010 . . .

Number in Yellowstone ±200

Where to see

- Summer: Lamar Valley; some may be near the North Entrance near Gardiner, Montana.
- Winter: between the North Entrance and Reese Creek.

Behavior and Size

- Male (buck) weighs 100–125 pounds; female (doe) weighs 90–110 pounds; adult length is 45–55 inches and height is 35–40 inches at shoulder.
- Average life span: 7–10 years.
- Young (fawns) born in late May–June.
- Live in grasslands.
- Can run for several miles at 45 mph.
- Eat sagebrush and other shrubs, forbs, some grasses.
- Both sexes have horns; males are pronged.

History

- Prior to European American settlement of the West, pronghorn population estimated to be 35 million.
- Early in the 19th century, pronghorn abundant in river valleys radiating from Yellowstone; settlement and hunting reduced their range and numbers.
- Park management also culled pronghorn during the first half of the 20th century due to overgrazing concerns.

Research Concerns

- Pronghorn are designated species of special concern in the park.
- During 1991–1995, the population dropped approximately 50%; possible causes include predation and loss of winter range.
- This small population could face extirpation from random catastrophic events such as a severe winter or disease outbreak.



they begin to follow the females as they forage. Several females and their youngsters join together in nursery herds along with yearling females.

Pronghorn form groups most likely for increased protection against predators. When one individual detects danger, it flares its white rump patch, signaling the others to flee. The pronghorn is adapted well for outrunning its enemies—its oversized windpipe and heart allow large amounts of oxygen and blood to be carried to and from its unusually large lungs. Pronghorn can sustain sprints of 45–50 mph. Such speed, together with keen vision, make the adults difficult prey for any natural predator. Fawns, however, can be caught by coyotes, bobcats, wolves, bears, and golden eagles.

The pronghorn breeding season begins mid-September and extends through early October. During the rut the older males “defend” groups of females (called a harem). They warn any intruding males with loud snorts and wheezing coughs. If this behavior does not scare off the opponent, a fight may erupt. The contenders slowly approach one another until their horns meet, then they twist and shove each other. Eventually, the weaker individual will retreat. Although the fights may be bloody, fatalities are rare.

The most important winter foods are shrubs like sagebrush and rabbitbrush; they eat succulent forbs during spring and summer. They can eat lichens and plants like locoweed, lupine, and poisonvetch that are toxic to some ungulates. Their large liver (proportionately, almost twice the size of a domestic sheep’s liver) may be able to remove plant toxins from the blood stream. Grasses appear to be the least-used food item, but may be eaten during early spring when the young and tender shoots are especially nutritious.

During winter, pronghorn form mixed-sex and-age herds. In spring, they split into

smaller bands of females, bachelor groups of males between 1–5 years old, and solitary older males. The small nursery and bachelor herds may forage within home ranges of 1,000 to 3,000 acres while solitary males roam smaller territories (60 to 1,000 acres in size). Pronghorn, including three-fourths of the individuals in Yellowstone, migrate between different winter and summer ranges to more fully utilize forage within broad geographic areas.

History

During the early part of the 19th century, pronghorns ranked second only to bison in numbers, with an estimated 35 million throughout the West. The herds were soon decimated by conversion of rangeland to cropland, professional hunters who sold the meat, and ranchers who believed that pronghorns were competing with livestock for forage. Today, due to transplant programs and careful management, pronghorns again roam the sagebrush prairies in herds totaling nearly one-half million animals.

Pronghorn in Yellowstone have not fared as well. The park’s pronghorn population declined in the 1960s and again in the 1990s. Research in 1991 found that the average fawn life span that year was about 35 days and nearly all collared pronghorn fawns were apparently killed by coyotes. This mortality rate closely followed the decline in total fawn numbers measured during weekly surveys of the entire park. In 1999 another cooperative study was initiated to determine fawn productivity and mortality rates. Other factors include declining amount and quality of winter range as private lands are taken out of agriculture.

Research continues to search for answers to the population decline. This small population is susceptible to extirpation from random catastrophic events such as a severe winter or disease outbreak.



Wolves ranged widely throughout North America in pre-Columbian times.

Worldwide, all wolves, except the red wolf (*Canis rufus*) of the southeastern United States, are the same species (*Canis lupus*).

Wolves are highly social animals and live in packs. In Yellowstone, packs contain from 8 to 14 individuals, with some occasionally having twice that number. Pack size varies based on the size of its main prey. The pack is a complex social family, with leaders (the alpha male and alpha female) and subordinates, each having individual personality traits and roles in the pack. Packs generally command territory that they mark by urine scenting and defend against intrusion by other wolves (individuals or packs).

Wolves consume a wide variety of prey, large and small. They efficiently hunt large prey that other predators cannot usually kill. They also compete with coyotes (and, to a lesser extent, foxes) for smaller prey. In Yellowstone, 90 percent of their winter prey is elk; 25 percent of their summer prey is deer. They also can kill adult bison.

Many other animals benefit from wolf kills. For example, when wolves kill an elk, ravens arrive almost immediately. Coyotes arrive soon after, waiting nearby until the wolves are sated. Bears will attempt to chase the wolves away, and are usually successful. Many other animals—from magpies to foxes—consume the remains.

Changes in Their Prey

From 1995 to 2000, in early winter, elk calves comprised 50 percent of wolf prey and bull elk comprised 25 percent. That ratio reversed from 2001 to 2007. Scientists are examining why this happened and what it means. They know that bull elk are entering winter in worse condition than before. Therefore, bulls are easier to kill than

As of January 2010 . . .

Number in Yellowstone area

- 400–450 wolves in the greater Yellowstone area.
- ±120 individuals live in the park.

Where to see

They inhabit most of the park now, look at dawn and dusk.

Behavior & Size

- 26–36 inches high at the shoulder, 4–6 feet long from nose to tail tip; males weigh 100–130 pounds, females weigh 80–110 pounds.
- Home range: 18–540 square miles; varies with pack size, food, season.
- Typically live 3–4 years in wild; can live up to 11 years in wild.
- Three color phases: gray, black, and white; gray is the most com-

mon; white is usually in the high Arctic; and black is common only in the Rockies.

- Prey primarily on hoofed animals. In Yellowstone, 90% of their winter diet is elk; more deer in summer; also eat a variety of smaller mammals like beavers.
- Mate in February; give birth to average of five pups in April after a gestation period of 63 days; young emerge from den at 10–14 days; pack remains at the den for 3–10 weeks unless disturbed.
- Human-caused death is the highest mortality factor for wolves outside the park; the leading natural cause is wolves killing other wolves.

Current Management

See Chapter 8, “Wolf Restoration.”

before, and one bull provides much more meat than one calf or cow.

Wolves may be consuming as many pounds of meat each year, but working harder for that food. When such “food stress” occurs, it can lead to increased wolf mortality—which was seen in 2008. (See below.) Food stress may increase when a large number of older, unhealthy elk—those easiest to kill—died during the winter.

Population

From their confined beginnings in a few pens, the wolves have expanded their population and range, and now are found throughout the Greater Yellowstone Ecosystem. While their exact numbers are not known, scientists know that the wolf population fluctuates.

Disease periodically kills a number of pups. The first serious outbreak was 1999, then six years later in 2005. That year, distemper killed two-thirds of the pups. The next outbreak was just three years later, in 2008,

Wolves kill each other and other carnivores, such as coyotes and cougars, usually because of territory disputes or competition for carcasses. In 2000, however, the subordinate female wolves of the Druid pack exhibited behavior never seen before: they killed their pack’s alpha female; then they carried her pups to a central den and raised them with their own litters.

when all but 22 of the pups died. This shortened interval concerns scientists. Infectious canine hepatitis, canine parvovirus, and sarcopit mangle also have been confirmed among adult wolves, but their effect on mortality is unknown.

Adult wolves kill each other in territory disputes. Such disputes happen each year, but increase when food is less abundant. This may have been why so many adult wolves died in fights during 2008. That year, scientists also found two wolves whose deaths were partially due to starvation.

History

In the 1800s, westward expansion brought settlers and their livestock into direct contact with native predator and prey species. Much of the wolves' prey base was destroyed as agriculture flourished. With the prey base removed, wolves began to prey on domestic stock, which resulted in humans eliminating wolves from most of their historic range. (Other predators such as bears, cougars, and coyotes were also killed to protect livestock and "more desirable" wildlife species, such as deer and elk.) By the mid 20th century, wolves had been almost entirely eliminated from the 48 states.

Today, it is difficult for many people to understand why early park managers would have participated in the extermination of wolves. After all, the Yellowstone National Park Act of 1872 stated that the Secretary of the Interior "shall provide against the wanton destruction of the fish and game found within said Park." But this was an era before people, including many biologists, understood the concepts of ecosystem and the interconnectedness of species. At the time, the wolves' habit of killing prey species was considered "wanton destruction" of the animals. Between 1914 and 1926, at least 136 wolves were killed in the park; by the 1940s, wolves were rarely reported.

In the 1960s, National Park Service wildlife management policy changed to allow populations to manage themselves. Many suggested at the time that for such regulation to succeed, the wolf had to be a part of the picture.

Also in the 1960s and 1970s, national awareness of environmental issues and consequences led to the passage of many

laws designed to correct the mistakes of the past and help prevent similar mistakes in the future. One such law was the Endangered Species Act, passed in 1973. The U.S. Fish and Wildlife Service is required by this law to restore endangered species that have been eliminated, if possible. (National Park Service policy also calls for restoration of native species where possible.)

Wolves & Humans

Wolves are not normally a danger to humans, unless humans habituate them by providing them with food. No wolf has attacked a human in Yellowstone, but a few attacks have occurred in other places. Most were from wolves that had become conditioned to human foods. Like coyotes, wolves can quickly learn to associate campgrounds, picnic areas, and roads with easy food. This often leads to aggressive behavior toward humans.

What You Can Do

- Never feed a wolf or any other wildlife. Do not leave food or garbage outside unattended. Make sure the door is shut on a garbage can or dumpster after you deposit a bag of trash.
- Treat wolves with the same respect you give any other wild animal. If you see a wolf, do not approach it.
- Never leave small children unattended.
- If you have a dog, keep it leashed.
- If you are concerned about a wolf—it's too close, not showing sufficient fear of humans, etc., do not run. Stop, stand tall, watch what the wolf is going to do. If it approaches, wave your arms, yell, flare your jacket, and if it continues, throw something at it or use bear pepper spray. Group up with other people, continue waving and yelling.
- Report the presence of wolves near developed areas or any wolf behaving strangely.

To date, eight wolves in Yellowstone National Park have become habituated to humans. Biologists successfully conducted aversive conditioning on some of them to discourage being close to humans, but two have had to be killed. In 2009, a wolf had to be killed because people had fed it, and it began to chase bicyclists at Old Faithful.

Never feed any animals!

See Chapter 2 for how wolves are affecting the ecosystem and Chapter 8, "Wolf Restoration," for more details about their management.

Records of bird sightings have been kept in Yellowstone since its establishment in 1872; these records document 322 species of birds to date, of which approximately 148 species are known to nest in the park. This is remarkable considering the harsh conditions that characterize the area.

Many birds, such as American robins and common ravens, are found throughout the park. Other species live in specific habitats. For example, belted kingfishers are found near rivers and streams while Steller's jays are found in moist coniferous forests.

Spring is a good time to look for birds. Migration brings many birds back to the park from their winter journeys south; other birds are passing through to more northern nesting areas. Songbirds are singing to establish and defend their territories; and many ducks are in their colorful breeding plumages, which makes identification easier.

Watch for birds on early morning walks from mid-May through early July. At all times, but especially during the nesting season, birds should be viewed from a distance. Getting too close can stress a bird (as it can any animal) and sometimes cause the bird to abandon its nest.

Most birds migrate to lower elevations and more southern latitudes beginning in September. At the same time, other birds pass through Yellowstone. Fall transients include tundra swans and ferruginous hawks. Birds that stay in Yellowstone year-round include: the common raven, Canada goose, blue grouse, gray jay, red-breasted nuthatch, American dipper, and mountain chickadee. A few species, such as rough-legged hawks and bohemian waxwings, migrate here for the winter.

Brief descriptions of some of Yellowstone's significant bird species follow.

As of January 2010 . . .

Number in Yellowstone

- 322 bird species have been documented in Yellowstone.
- Approximately 148 of these species nest in the park.

Other Info

- One endangered bird species previously occurred in the greater Yellowstone area: the whooping crane.
- The peregrine falcon nests here. Formerly an endangered species, it was delisted in 1999.
- The bald eagle nests here. Formerly a threatened species, it was delisted in 2007.
- Species monitored: songbirds, American white pelicans, trumpeter swans, loons, ospreys, bald eagles, peregrine falcons, and colonial nesting birds.

Current Management

Yellowstone participates in the Western Working Group of Partners in Flight, an international effort to protect migrant land birds in the Americas, because more than 100 bird species spend the winter in Mexico and Central America. There, they are threatened by loss of habitat, pesticide use, and increasing human development and pressure.

In addition, park biologists are:

- Surveying 3 breeding bird routes annually, which is part of an international effort to monitor bird population trends.
- Studying the relationship between songbirds and willows, which will establish a longterm database to help fill a gap in songbird knowledge.
- Surveying forest burns to determine how fire influences cavity-nesting birds in Yellowstone.



Visitors often ask, "What is the black and white bird with the long tail?" They have seen the black-billed magpie, a gregarious bird found throughout the West. In the right light, its dark feathers appear a shiny blue-black or green-black.



Bald Eagle *Haliaeetus leucocephalus*

Identification

- Large, dark bird; adult (four or five years old) has completely white head and tail.
- Females larger than males, as is true with most predatory birds.
- Immature bald eagles show varying amounts of white; they can be mistaken for golden eagles.

Habitat

Habitat can be a clue to which eagle you are seeing:

- Bald eagles are usually near water where they feed on fish and waterfowl.
- Golden eagles hunt in open country for rabbits and other small mammals.
- Exception: Both feed on carcasses in the winter, sometimes together.

Behavior

- Bald eagles nest in large trees close to water.
- In severe winters, eagles may move to lower elevations such as Paradise Valley, north of the park, where food is more available. On these wintering areas, resident eagles may be joined by migrant bald eagles and golden eagles.
- Feed primarily on fish, except in winter when fish stay deeper in water.
- In winter, they eat more waterfowl.
- Eat carrion in winter if it is readily available.
- Form long-term pair bonds.
- Some remain on their territories year-round, while others return to their nesting sites by late winter.
- Two to three eggs (usually two) laid from February to mid-April.
- Both adults incubate the eggs, which hatch in 34 to 36 days.
- At birth, eaglets are immobile, downy, have their eyes open, and are completely dependent upon their parents for food.
- When 10–14 weeks old, they can fly from the nest.
- Some young migrate in fall to western Oregon and Washington.
- Many adults stay in the park year-round.

Status

- Removed from the threatened species list in August 2007.
- As of 1989, recovery objectives had been reached in the Greater Yellowstone Ecosystem.
- Some eagle territories are experiencing nest instability due to large numbers of trees that are falling as a result of the 1988 fires.
- In 2009, 15 pairs of eagles nested in the park; 6 of these pairs produced 8 young.
- Although the population is relatively stable parkwide, none of the nests in the Yellowstone Lake area succeeded.
- Bald eagles, like osprey, are among the fish-eating wildlife being monitored to find out if the declining cutthroat trout population is affecting them. (See Chapter 8.)

Peregrine Falcon *Falco peregrinus*

Because of the peregrine's great speed and low population numbers, sightings in Yellowstone are uncommon.

Identification

- Slightly smaller than a crow.
- Black "helmet" and a black wedge below the eye.
- Uniformly gray under its wings.
(The prairie falcon, which also summers in Yellowstone, has black "armpits.")
- Long tail, pointed wings.

Habitat

- Near water, meadows, cliffs.
- Nests on large cliffs overlooking rivers or valleys where prey is abundant.

Behavior

- Resident in the park March through October, when its prey—songbirds and waterfowl—are abundant in park.
- Lays 3–4 eggs in late April to mid-May.
- Young fledge in July or early August.
- Migrates as far south as Mexico.
- Dives at high speeds (can exceed 200 mph) and strikes prey in mid-air.

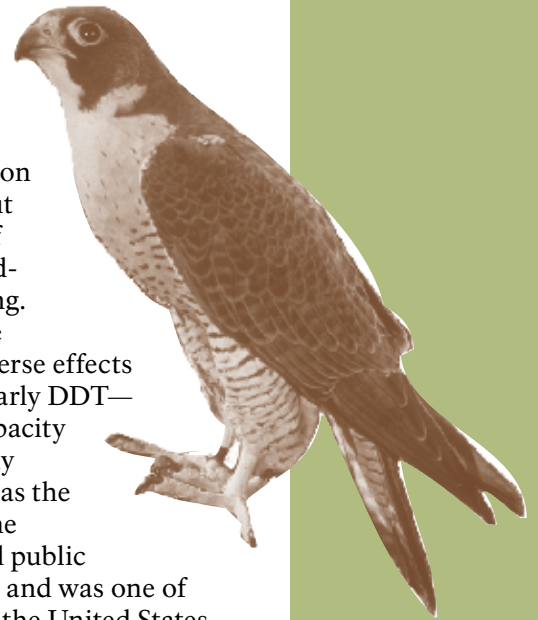
Status

- Yellowstone was a site for peregrine reintroductions in the 1980s.
- Reintroductions were discontinued after 1988 because the peregrine population was increasing on its own.
- The peregrine was removed from the federal endangered/threatened species list in 1999 because of its widespread recovery.
- Up to 32 eyries have been documented in one year in Yellowstone, but not all are monitored each year.
- In 2009, 18 pairs of peregrine falcons bred in Yellowstone National Park; 14 pairs produced 28 young.

In 1962, Rachel L. Carson sounded an alarm about the irresponsible use of pesticides with her landmark book, *Silent Spring*. Among the dangers she described were the adverse effects of chemicals—particularly DDT—on the reproductive capacity of some birds, especially predatory species such as the bald eagle and peregrine falcon. Her book raised public awareness of this issue, and was one of the catalysts leading to the United States banning the most damaging pesticides.

The peregrine falcon was among the birds most affected by the toxins. It was listed on the endangered species list and a reintroduction program was spearheaded by groups such as the non-profit Peregrine Fund of Boise, Idaho. Subsequently, the peregrine has made a comeback in much of its former range and was delisted in 1999.

Biologists in Yellowstone National Park will continue to monitor peregrine breeding to maintain the longterm data needed to assess the population of this sensitive species.





Osprey *Pandion haliaeetus*

Identification

- Slightly smaller than bald eagle.
- Mostly white belly, white head with dark streak through eye.
- Narrow wings with dark patch at bend or “wrist.”

Habitat

- Usually near lakes (such as Yellowstone Lake), river valleys (such as Hayden and Lamar valleys), and in river canyons (such as the Gardner Canyon and the Grand Canyon of the Yellowstone River).

Behavior

- Generally returns to Yellowstone in April; departs for warmer climates by September.
- Builds nest of sticks in large trees or on pinnacles close to water.
- Lays 2–3 eggs in May to June.
- Eggs hatch in 4–5 weeks.
- Young can fly when 7–8 weeks old.
- Feed almost entirely on fish.
- Often hovers 30–100 feet above water before diving for a fish.
- In the air, arranges the fish with its head pointed forward to reduce its resistance to air.

Status

- Like many other birds of prey, osprey populations declined due to pesticides in the mid-20th century. (*See previous page.*)
- Its populations rebounded during the latter part of the 20th century.
- In Yellowstone, the osprey population fluctuates, with 31 nests producing 25 young in 2007 and a high of 100 nests and 101 fledglings in 1994.
- Overall, osprey reproduction has increased each year since 2003.
- In 2009, osprey occupied 27 nests; 13 of these breeding pairs successfully fledged 28 young. However, none of the nests in the Yellowstone Lake area succeeded.
- Osprey in Yellowstone are being monitored, along with other fish-eating wildlife, to find out if they are affected by the declining population of cutthroat trout. (*See Chapter 8.*)

Trumpeter Swan *Cygnus buccinator***Identification**

- Largest wild fowl in North America.
- White feathers, black bill with a pink streak at the base of the upper mandible.
- During migration, can be confused with the tundra swan, which is smaller, lacks the pink mandible stripe, sometimes has a yellow spot in front of eye, and a rounder head.

Habitat

- Slow moving rivers or quiet lakes.
- Nest is a large, floating mass of vegetation.

Behavior

- Feed on submerged vegetation and aquatic invertebrates.
- Low reproduction rates; in 2007, no cygnets fledged.
- Can fail to hatch eggs if disturbed by humans.
- Lay 4–6 eggs in June; cygnets fledge in late September or early October.
- Usually in pairs with cygnets in summer; larger groups in winter.

Status

- North American population of trumpeter swans is recovering from decades of habitat destruction, hunting, and poaching.
- Trumpeter swans are increasing in the Rocky Mountain region, stable in the Greater Yellowstone Ecosystem, but declining in Yellowstone National Park.
- Winter population in the region varies from 2,000–4,000; in the park, varies between less than one hundred to several hundred swans.
- In 2009, only 2 pairs of trumpeter swans nested in Yellowstone National Park; neither successfully hatched eggs.
- Limiting factors in Yellowstone appear to be flooding of nests, predation by coyotes, competition with wintering swans, possibly effects of drought, and less immigration into the park from outside locations.
- The swan pair that used the floating nesting platform at Seven Mile Bridge on the Madison River lost the male to predation in 2001. In 2004, the female re-mated; but she and her mate were killed by predators.



Trumpeter swans in North America neared extirpation in the early 1900s due to human encroachment, habitat destruction, and the commercial swan-skin trade. Small populations survived in isolated areas such as Yellowstone. Red Rock Lakes National Wildlife Refuge, west of the park, was set aside in the 1930s specifically for the trumpeter swan. In the 1950s, a sizeable population of swans was discovered in Alaska. Today, more than 20,000 trumpeters exist in North America.

In Yellowstone, however, resident trumpeter swans have rarely numbered more than 20 individuals in recent years. Winter numbers vary from 60 to several hundred. Reproduction rates are low.

One threat has been eliminated. Mute swans were introduced in the 1960s by landowners in Paradise Valley, north of the park. These non-native swans threatened to displace native trumpeter swans in the region. However, beginning in 1989, mute swans were replaced on private lands with captive-raised trumpeter swans. Now more than one dozen adult trumpeter swans reside and nest in Paradise Valley. These swans have contributed to the park's population of trumpeter swans.

In fall and winter, look closely at a swan—it could be a trumpeter, which is native to the park, or a tundra swan, which is passing through. The swan above, which has a yellow spot near the eye, is a tundra swan. Trumpeter swans have a thin pink stripe at the base of their upper mandible.

7B

Birds



Sandhill cranes (left) nest in Yellowstone each summer. Their guttural calls announce their presence long before most people see them—their gray feathers blend in well with their grassland habitat. The all-white whooping crane, one of the world's most endangered birds, was the subject of recovery efforts in the Greater Yellowstone Ecosystem from 1975 until 2002. The last remaining whooping crane frequented the Centennial Valley of Montana (west of Yellowstone National Park). It was declared dead in the spring of 2002, marking the end of the experimental recovery efforts in Greater Yellowstone.

American white pelicans (right) spend the summer mainly on Yellowstone Lake and the Yellowstone River. These large white birds are often mistaken for trumpeter swans until their huge yellow beak and throat pouch are seen. Their black wing tips separate them from swans, which have pure white wings.



Ravens frequent parking lots, and have learned to unzip and unsnap packs. Do not allow them access to your food.

Some ravens have also learned to follow wolves during hunts. They wait in trees or on the ground, until wolves finish at a carcass. Other animals—such as coyotes, eagles, black-billed magpies, and red fox—also may be waiting nearby.



Several raven relatives live in Yellowstone, including the Clark's nutcracker (left) and gray jay (right). Like the raven, they often show up where people are eating. Do not feed them. They have plenty of natural food available.



The dark gray American dipper (left) can be seen bobbing beside and diving into streams and rivers. The dipper, also called the water ouzel, dives into the water and swims in search of aquatic insects. Thick downy feathers and oil from a preening gland enable this bird to survive the cold waters of Yellowstone.



Yellowstone contains one of the most significant, near-pristine aquatic ecosystems found in the United States. More than 600 lakes and ponds comprise approximately 107,000 surface acres in Yellowstone—94 percent of which can be attributed to Yellowstone, Lewis, Shoshone, and Heart lakes. Some 1,000 rivers and streams make up approximately 2,500 miles of running water.

This may appear to be prime fish habitat, but waterfalls and other physical barriers prevent fish from colonizing the smaller headwater streams and isolated lakes. When Yellowstone became a national park, approximately 40 percent of its waters were barren of fish—including Lewis Lake, Shoshone Lake, and the Firehole River above Firehole Falls. That soon changed.

Early park managers transplanted fish into new locations, produced more fish in hatcheries, and introduced non-native species. Today, about 40 lakes have fish; the others either were not planted or have reverted to their original fishless condition.

The ranges and densities of the park's native trout and grayling were substantially altered during the 20th century due to exploitation and introduction of non-native species. Non-native species in the park include rainbow trout, brown trout, brook trout, lake trout, and lake chub.

Despite changes in species composition and distribution, large-scale habitat degradation has not occurred. Water diversions, water pollution, and other such impacts on aquatic ecosystems have rarely occurred here. Consequently, fish and other aquatic inhabitants continue to provide important food for grizzly and black bears, bald eagles, river otters, mink, ospreys, pelicans, loons, grebes, mergansers, ducks, terns, gulls, kingfishers, and herons.

The U.S. Fish and Wildlife Service maintained an aquatic research and monitoring program in the park for approximately 30

As of January 2010 . . .

Number in Yellowstone

- Native species: 11
 - 3 sport fish: cutthroat trout (two subspecies), Arctic grayling, mountain whitefish
 - 8 non-game fish: 4 minnows: longnose dace, speckled dace, redbside shiner, Utah chub; 3 suckers: longnose sucker, mountain sucker, Utah sucker; mottled sculpin
- Non-native species: 5
 - brook trout, brown trout, lake trout, rainbow trout, lake chub

History

- When the park was established, many of its waters were fishless.
- Park waters were stocked with native and non-native fish until the mid-1950s.
- Stocking changed the ecology of many Yellowstone waters as non-native fish displaced or interbred with native species.

Status

- By the 1960s, Yellowstone's trout populations were in poor condition and the angling experience had declined.
- By the late 1980s, native trout had recovered in some areas due to restrictions in fish harvest.
- In 2001, fishing regulations changed to require the release of all native fishes caught in park waters.
- Both subspecies of cutthroat trout are considered to be species at risk.
- Threats to the fisheries:
 - 1) Lake trout illegally introduced into Yellowstone Lake and its tributaries.
 - 2) Whirling disease now present in Yellowstone Lake, the Yellowstone and Firehole rivers, and Pelican Creek.
 - 3) New Zealand mud snails.
 - 4) Competition and hybridization with non-native rainbow trout (Slough Creek) and brook trout (Soda Butte Creek).

See Chapter 8, "Aquatic Invaders."

years, ending in 1996. Since then, National Park Service fisheries managers have focused on the same objectives: to manage aquatic resources as an important part of the park ecosystem, preserve and restore native fishes and their habitats, and provide anglers with the opportunity to fish for wild fish in a natural setting.

Volunteer Angler Report

Anglers contribute to the park's fisheries database by filling out the Volunteer Angler Report card that is issued with each fishing license. This information helps managers monitor the status of fisheries throughout the park.

Fish-watching numbers

Fishing in Yellowstone National Park

About 75,000 of the park's three million visitors fish each year. Angling is an anomaly in a park where the primary purpose is to preserve natural environments and native species in ways that maintain natural conditions. Yet fishing has been a major visitor activity here for more than 100 years. Fishing is a major industry in the Greater Yellowstone Ecosystem, and park anglers spend more than \$4 million annually on their sport. Angler groups have supported management actions, such as closing the Fishing Bridge to fishing in the early 1970s, and have helped fund research on aquatic systems.

Observing fish in their natural habitat is also a popular activity for visitors. In the 1980s and 1990s, fisheries biologists monitored non-consumptive use of aquatic resources for about a decade at Fishing Bridge and LeHardys Rapids. In 1994, approximately 176,400 visitors watched fish at LeHardys Rapids, where spawning cutthroat can be observed jumping the rapids. At Fishing Bridge, approximately 167,000 people watched cutthroat trout in the waters below the bridge.

Fishing Regulations

Strict regulations allow ecological processes to function with minimal interference from humans and preserve fish populations for the animals that depend on them. Complete regulations are at all ranger stations and visitor centers. In summary:

- Fishing is allowed only during certain seasons (usually late May through early November).
- A permit is required (revenue stays in the park to support park programs).
- Terminal tackle must be lead-free (lead poisoning is a serious threat to waterfowl).
- All native sport fish—cutthroat trout, Arctic grayling, and mountain whitefish—must be released.
- Lake trout must be killed if caught in Yellowstone Lake and its tributaries.
- Certain waters may be closed to protect rare or endangered species, nesting birds, or to provide undisturbed vistas.

- To protect fish, park waters may be temporarily closed to fishing when water levels are low and water temperatures are high.

Changes in Yellowstone Waters

- Historically, only Yellowstone cutthroat trout and longnose dace populated Yellowstone Lake. Today, these two species are still present, but the longnose sucker, lake chub, redbreasted shiner, and lake trout have been introduced into the lake.
- Most of the Firehole River historically was fishless because Firehole Falls blocked fish from moving upstream. Today, anglers can fish for rainbow trout, brown trout, brook trout, and Yellowstone cutthroat trout in the thermally influenced stream.
- Historically, the Madison and Gibbon rivers (below Gibbon Falls) were inhabited by westslope cutthroat trout, Arctic grayling, mountain whitefish, mottled sculpin, mountain sucker, and longnose dace. Today, some of those species survive (some in extremely depleted numbers) and brown trout, rainbow trout, and brook trout have been added to the mix.
- When Heart Lake was first sampled for fish, Yellowstone cutthroat trout, mountain whitefish, speckled dace, redbreasted shiner, Utah sucker, Utah chub, and the mottled sculpin were found.
- Lewis and Shoshone lakes were historically fishless because of waterfalls on the Lewis River. Today, the lakes support lake trout, brown trout, brook trout, Utah chub, and redbreasted shiner.
- The lower Lamar River and Soda Butte Creek historically were home to Yellowstone cutthroat trout, longnose dace, longnose sucker, and mountain sucker. Today, those species persist, but native trout are threatened by hybridization with rainbow trout and competition with brook trout.

Cutthroat Trout *Oncorhynchus clarkii*

In the greater Yellowstone ecosystem, cutthroat trout are considered a keystone species, upon which many other species depend. For example, they spawn in shallow water, where they become an important food resource for other Yellowstone wildlife, including the grizzly bear. They are at great risk from hybridization and competition with non-native trout, and predation by non-native lake trout.

Yellowstone Cutthroat Trout

Oncorhynchus clarkii bouvieri

- Includes two forms of the same subspecies: Yellowstone cutthroat (large spotted form)
Snake River cutthroat (fine spotted form)
- Yellowstone cutthroat is native to the Yellowstone River, its tributaries, the Snake River, and the Falls River.
- Snake River cutthroat is native to Snake River drainage in and beyond Yellowstone and Grand Teton national parks.
- Require cold, clean water in streams or lakes.
- Spawn in rivers or streams in early May through mid-July.
- Most important foods are aquatic insects—mayflies, stoneflies, caddisflies, etc.—plus terrestrial insects that fall into the water.
- Also eat smaller fish, fish eggs, small rodents, frogs, algae and other plants, and plankton.

While the Yellowstone cutthroat trout is historically a Pacific drainage species, it has (naturally) traveled across the Continental Divide into the Atlantic drainage. One possible such passage in the Yellowstone area is Two Ocean Pass, south of the park in the Teton Wilderness. Here, it's possible for a fish to swim across the Continental Divide at the headwaters of Pacific Creek and Atlantic Creek and, thus, swim from the Pacific to the Atlantic watersheds and vice versa.

Management

Yellowstone Lake and Yellowstone River together contain the largest inland population of cutthroat trout in the world. For many years, the fish in Yellowstone Lake have been intensively monitored and studied. In the 1960s, fisheries managers determined that angler harvest was excessive and negatively impacting the fishery. Increasingly restrictive angling regulations were put into place, which helped restore cutthroat trout population numbers and age structure. Whirling disease and illegally introduced lake trout in Yellowstone Lake now pose a serious threat to the cutthroat trout population.

Westslope Cutthroat Trout

Oncorhynchus clarkii lewisii

- Evolved independently of the Yellowstone and Snake River forms of the species, but shares their food and habitat requirements. (See above.)
- Originally throughout the Madison and Gallatin river drainages in Yellowstone National Park.
- Currently reduced to small headwater populations due to competition and interbreeding with non-native fish.
- Habitat loss and pollution negligible in the park.

Management

This subspecies is at risk through interbreeding with non-native rainbow trout and transplanted Yellowstone cutthroat trout. DNA analysis initially identified a genetically pure population in North Fork Fan Creek, but more detailed analysis showed that this population is now hybridizing with rainbow trout. The only known genetically pure populations in Yellowstone have been found in a tributary of Grayling Creek and in the Oxbow/Geode Creek complex. An intensive effort is underway to restore westslope cutthroat trout to Specimen Creek, a tributary to the Gallatin River.

See Chapter 8 for information about fisheries management.

Whirling disease is a parasitic infection of fish caused by a microscopic protozoan that destroys the cartilage of juvenile trout. Seriously infected fish have a reduced ability to feed or escape from predators and mortality is high. See Chapter 8 for details.

Arctic Grayling

Thymallus arcticus montanus

- Used to share similar habitat with west-slope cutthroat trout and whitefish (with which it is sometimes confused).
- Displaced by non-native species.
- Native, river-dwelling form (fluvial) extinct in the park.
- Because of stocking in the 1920s, grayling live in Grebe, Wolf, and Cascade lakes.
- In these lakes, grayling spawn in June.

- Like trout, grayling eat mostly insects.

Management

Current efforts on behalf of the grayling include habitat surveys in the upper reaches of Grayling Creek to determine if a restoration project is possible in that location. Yellowstone National Park, Gallatin National Forest, and Montana Fish, Wildlife and Parks are working together on this project.

Mountain Whitefish

Prosopium williamsoni

- Slender silver fish, sometimes confused with grayling.
- Lives in Yellowstone's rivers and streams.
- Requires deep pools, clear and clean water, and is very sensitive to pollution.
- Unlike other native fish, the whitefish spawns in the fall.

- Generally feeds along the bottom, eating aquatic insect larvae.
- Compete with trout for the same food.
- The whitefish has persisted in its native waters, unlike grayling.

NONGAME NATIVE FISH

Suckers: longnose, mountain, and Utah

- Bottom-dwelling fish that use ridges on their jaws to scrape aquatic flora and fauna from rocks.
- Eaten by birds, bears, otters, and large cutthroat trout.
- Habitat distinguishes species:

Mountain sucker *Catostomus platyrhynchus*: cold, fast, rocky streams and some lakes.

Longnose sucker *C. catostomus*: Yellowstone River drainage below the Grand Canyon; Yellowstone Lake and its surrounding waters (introduced). Equally at home in warm and cold waters, streams and lakes, clear and turbid waters.

Utah sucker *C. ardens*: Snake River drainage.

Mottled sculpin *Cottus bairdi*

- Lives in shallow, cold water throughout Yellowstone except in the Yellowstone River above Lower Falls and in Yellowstone Lake.
- Eats small insects, some fish and plants.
- Eaten by trout.

Minnows

- Small fish living in a variety of habitats and eating a variety of foods.
- All four species eaten by trout.

Utah chub *Gila atraria*: Largest of the minnows (12 inches); native to Snake River drainage; seems to prefer slow, warm waters with abundant aquatic vegetation.

Longnose dace *Rhinichthys cataractae*: Most often found behind rocks and in eddies of cold, clear waters of the Yellowstone and Snake river drainages.

Redside shiner *Richardsonius balteatus*: Minnow of lakes; native to the Snake River drainage; has been introduced to Yellowstone Lake, where it might compete with native trout because its diet is similar to that of young trout.

Speckled dace *Rhinichthys osculus*: Lives in the Snake River drainage.

Yellowstone is home for a small variety of reptiles and amphibians. Glacial activity and current cool and dry conditions are likely responsible for their relatively low species diversity. However, they are widespread in the park and often abundant at breeding or wintering sites.

To monitor amphibians in Yellowstone, researchers are collecting data on the number of wetlands that are occupied by breeding populations of each amphibian species. If occupancy (the proportion of suitable wetlands occupied) decreases, that species has probably declined. To implement monitoring, researchers randomly selected watershed units, known as catchments, from within the four main drainage basins of Yellowstone (*see map*). Field crews search potential amphibian habitat within the catchments in June and July to document the presence or absence of amphibians. Researchers study the results to determine occupancy trends and factors that may be driving them.

Yellowstone provides a valuable study area; information about the status and trends of amphibians and reptiles here may shed light on declines documented in other high-elevation protected areas of the western U.S. Population declines may be caused by factors such as disease, drought or climate change, chemical contamination, non-native species, and habitat loss and fragmentation. In addition, because many amphibians and reptiles congregate to breed or overwinter, they can be adversely affected by disturbance or loss of key sites.

Amphibian Monitoring Sites

■ Monitored every year ■ Monitored every 5 years

As of January 2010 . . .

Number in Yellowstone

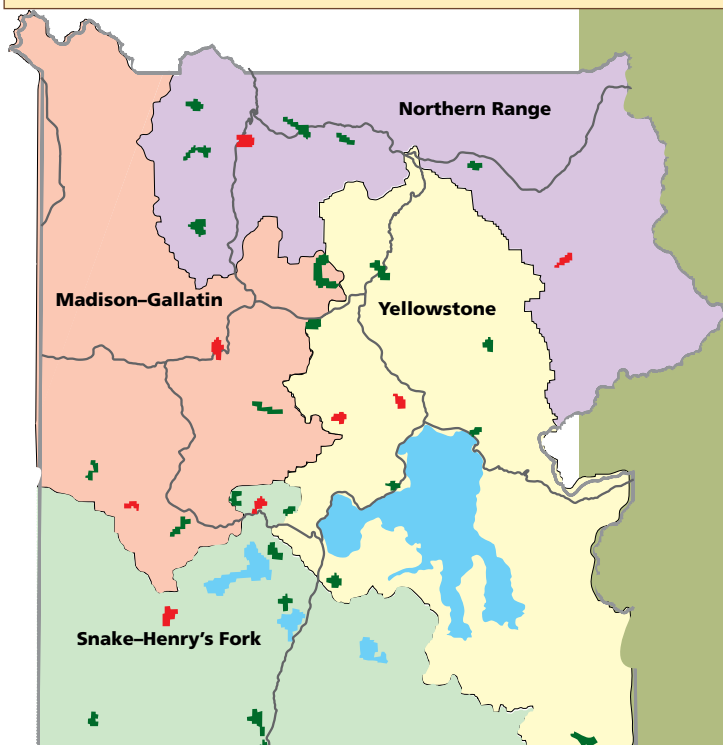
- Reptiles—six species: prairie rattlesnake, bull snake, valley garter snake, wandering garter snake, rubber boa, sagebrush lizard.
- Amphibians—four species: boreal toad, boreal chorus frog, Columbia spotted frog, tiger salamander.

Current Research

- 2000: Researchers begin inventorying reptiles and amphibians.
- 2004: NPS Greater Yellowstone Network selects amphibian occurrence as a Vital Sign for monitoring ecosystem health.
- 2006: Long-term, Vital Sign amphibian monitoring begins in Yellowstone.

Status

- Spotted and chorus frogs are widely distributed with many breeding sites in the park.
- Tiger salamanders are common and abundant in some portions of the Yellowstone, such as the northern range and Hayden Valley.
- Boreal toads are abundant in some local areas.
- None of the parks reptiles or amphibians are federally listed as threatened or endangered.
- Scientists are concerned about the boreal toad, which has declined sharply in other parts of the West.
- In 2008, a scientist reported drastically declined amphibian populations in the northern range, but the study is in question.



VALLEY GARTER SNAKE*Thamnophis sirtalis fitchi***Identification**

- Subspecies of the common garter snake.
- Medium sized snake up to 34 inches long.
- Nearly black background color with three bright stripes running the length of the body; underside is pale yellow or bluish gray.
- Most distinguishing characteristics of this subspecies in our region are the irregular red spots along the sides.

WANDERING GARTER SNAKE*T. elegans vagrans***Habitat**

- Thought to be common in the past, now in decline for no apparent reason.
- Closely associated with permanent surface water.
- In Yellowstone area, observed only in the Falls River drainage in the Bechler region and three miles south of the south entrance along the Snake River.

Behavior

- Generally active during the day.
- In the Yellowstone area it eats mostly toads, chorus frogs, fish remains, and earthworms; can eat relatively poisonous species.
- Predators include fish, birds, and carnivorous mammals.

Identification

- Most common reptile in the park.
- 6 to 30 inches long.
- Brown, brownish green, or gray with three light stripes—one running the length of the back and a stripe on each side.

Habitat

- Usually found near water in all areas of the park.
- Eats small rodents, fish, frogs, tadpoles, salamanders, earthworms, slugs, snails, and leeches.

Behavior

- May discharge musk from glands at the base of the tail when threatened.
- Gives birth to as many as 20 live young in late summer or fall.

BULL SNAKE *Pituophis catenifer sayi***Identification**

- A subspecies of the gopher snake, is Yellowstone's largest reptile, ranging from 50 to 72 inches long.
- Yellowish with a series of black, brown, or reddish-brown blotches down the back; the darkest, most contrasting colors are near the head and tail; blotches are shaped as rings around the tail.
- Head resembles a turtle's in shape, with a protruding scale at the tip of the snout and a dark band extending from the top of the head through the eye to the lower jaw.

Habitat

- In Yellowstone, found at lower elevations; drier, warmer climates; and open areas such as near Mammoth.

Behavior

- Lives in burrows and eats small rodents—behavior that gave the gopher snake its name.
- Often mistaken for a rattlesnake because of its appearance and its defensive behavior: when disturbed, it will coil up, hiss loudly, and vibrate its tail against the ground, producing a rattling sound.

Descriptive photos and illustrations exist in numerous books about these species; see "For More Information" on pages 150–154 for suggested titles.

Reptiles

Both reptiles and amphibians are ectothermic ("cold-blooded"), meaning they derive body heat from outside sources rather than generate it internally. Reptiles have scaly, dry skin. Some lay eggs; others bear live young. Amphibians have thin, moist glandular skin permeable to water and gases. The young must pass through a larval stage before changing into adults. Amphibious means "double life" and reflects the fact that salamanders, toads, and frogs live in water as larvae and on land for much of the rest of their lives.

RUBBER BOA *Charina bottae***Identification**

- Infrequently encountered in Yellowstone, perhaps due to its nocturnal and burrowing habits.
- One of two species of snakes in the United States related to tropical boa constrictors and pythons.
- Maximum length of 24 inches.
- Back is gray or greenish-brown, belly is lemon yellow; scales are small and smooth, making it almost velvety to the touch.

Habitat & Behavior

- Eats rodents.
- May spend great deal of time partially buried under leaves and soil, and in rodent burrows.
- Usually found in rocky areas near streams or rivers, with shrubs or trees nearby.
- Recent sightings have occurred in the Bechler region and Gibbon Meadows.

PRAIRIE RATTLESNAKE*Crotalis viridis viridis***Identification**

- Can be more than 48 inches in length.
- Greenish gray to olive green, greenish brown, light brown, or yellowish with dark brown splotches down its back that are bordered in white.

Habitat & Behavior

- Only dangerously venomous snake in the park.
- Lives in the lower Yellowstone River areas of the park, including Reese Creek, Stephens Creek, and Rattlesnake Butte, where the habitat is drier and warmer than elsewhere in the park.
- Usually defensive rather than aggressive.
- Only two snake bites are known during the history of the park.

**SAGEBRUSH LIZARD***Sceloporus graciosus graciosus***Identification**

- Only lizard in Yellowstone.
- Maximum size of five inches from snout to tip of the tail; males have longer tails and may grow slightly larger than females.
- Gray or light brown with darker brown stripes on the back set inside lighter stripes on the sides, running the length of the body; stripes not always prominent and may appear as a pattern of checks down the back; underside usually cream or white.
- Males have bright blue patches on the belly and on each side, with blue mottling on the throat.

Habitat

- Usually found below 6,000 feet but in Yellowstone lives up to 8,300 feet.
- Populations living in thermally influenced areas are possibly isolated from others.
- Most common along the lower portions of the Yellowstone River near Gardiner, Montana and upstream to the mouth of Bear Creek; also occurs in Norris Geyser Basin, Shoshone and Heart Lake geyser basins, and other hydrothermal areas.

Behavior

- Come out of hibernation about mid-May and active through mid-September.
- Diurnal, generally observed during warm, sunny weather in dry rocky habitats.
- During the breeding season males do push-ups on elevated perches to display their bright blue side patches to warn off other males.
- Feed on various insects and arthropods.
- Eaten by bull snakes, wandering garter snakes, rattlesnakes, and some birds.
- May shed tail when threatened or grabbed.

Amphibians

In the winter in Yellowstone, some amphibians go into water that does not freeze (spotted frogs), others enter underground burrows (salamanders and toads), and others (boreal chorus frog) actually tolerate freezing and go into a heart-stopped dormancy for the winter in leaf litter or under woody debris.

Toad or Frog?

Toads can easily be distinguished from frogs by their warty bodies, thick waists, and prominent glands behind their eyes.



BLOTCHED TIGER SALAMANDER

Ambystoma tigrinum melanostictum

Identification

- The only salamander in Yellowstone.
- Adults range up to about 9 inches, including the tail.
- Head is broad, with a wide mouth.
- Color ranges from light olive or brown to nearly black, often with yellow blotches or streaks on back and sides; belly is dull lemon yellow with irregular black spots.
- Larvae, which are aquatic, have a uniform color and large feathery gills behind the head; they can reach sizes comparable to adults but are considerably heavier.

BOREAL TOAD *Bufo boreas boreas*

Identification

- Yellowstone's only toad.
- Adults range up to about 4 inches, juveniles just metamorphosed from tadpoles are only one inch long.
- Stocky body and blunt nose.
- Brown, gray, or olive green with irregular black spots, lots of "warts," and usually a white or cream colored stripe down the back.
- Tadpoles are usually black and often congregate in large groups.



Habitat

- Breeds in ponds and fishless lakes.
- Widespread in Yellowstone in a great variety of habitats, with sizable populations in the Lamar Valley.

Behavior

- Adult salamanders come out from hibernation in late April to June, depending on elevation, and migrate to breeding ponds where they lay their eggs.
- Mass migrations of salamanders crossing roads are sometimes encountered, particularly during or after rain.
- After migration, return to their moist homes under rocks and logs and in burrows.
- Feed on adult insects, insect nymphs and larvae, small aquatic invertebrates, frogs, tadpoles, and even small vertebrates.
- Preyed upon by a wide variety of animals, including mammals, fish, snakes, and birds such as sandhill cranes and great blue herons.

Habitat

- Once common throughout the park, now appears to be much rarer than spotted frogs and chorus frogs; scientists fear this species has experienced a decline in the Greater Yellowstone Ecosystem.
- Adults can range far from wetlands because of their ability to soak up water from tiny puddles or moist areas.
- Lay eggs in shallow, sun-warmed water, such as ponds, lake edges, slow streams, and river backwaters.

Behavior

- Tadpoles eat aquatic plants; adults eat insects, especially ants and beetles, worms and other small invertebrates.
- Sometimes active at night.
- Defends itself against predators by secreting an irritating fluid from numerous glands on its back and behind the eyes.
- Eaten by snakes, mammals, ravens, and large wading birds.



COLUMBIA SPOTTED FROG

Rana luteiventris

Identification

- Abundant and best known amphibian in Yellowstone.
- Maximum length is 3.2 inches, newly metamorphosed juveniles less than one inch long.
- Upper surface of the adult is gray-brown to dark olive or even green, with irregular

black spots; skin is bumpy; underside is white splashed with brilliant orange on the thighs and arms on many but not all individuals.

- Tadpoles have long tails and may grow to 3 inches long.

Habitat

- Found all summer along or in rivers, streams, smaller lakes, marshes, ponds, and rain pools.
- Lay eggs in stagnant or quiet water, in globular masses surrounded by jelly.

Behavior

- Breeds in May or early June, depending on temperatures.
- Tadpoles mature and change into adults between July and September.
- Tadpoles eat aquatic plants, adults mostly eat insects but are highly opportunistic in their food habits (like many other adult amphibians).



BOREAL CHORUS FROG

Pseudacris maculata

Identification

- Adults reach 1 to 1.5 inches in length, and females are usually larger than males; newly metamorphosed juveniles are less than one inch long.
- Brown, olive, tan, or green (sometimes bi-colored) with a prominent black stripe on each side from the nostril through the eye and down the sides to the groin; three dark stripes down the back, often incomplete or broken into blotches.

Habitat

- Common, but seldom seen due to its small size and secretive habits.
- Live in moist meadows and forests near wetlands.
- Lays eggs in loose irregular clusters attached to submerged vegetation in quiet water.

Behavior

- Breeds in shallow temporary pools or ponds during the late spring.
- Calls are very conspicuous, resemble the sound of a thumb running along the teeth of a comb.
- Males call and respond, producing a loud and continuous chorus at good breeding sites, from April to early July, depending on elevation and weather.
- Usually call in late afternoon and evening.
- Tadpoles eat aquatic plants; adults mostly eat insects.
- Eaten by fish, predacious aquatic insect larvae, other amphibians, garter snakes, mammals, and birds.

For More Information

www.nps.gov/yell

www.greateryellowstone-science.org/index.html

Yellowstone Science, free from the Yellowstone Center for Resources, in the Yellowstone Research Library, or online at www.nps.gov/yell.

Yellowstone Today, distributed at entrance gates and visitor centers.

Site Bulletins, published as needed, provide more detailed information on park topics such as wildlife and geology. Free; available upon request from visitor centers.

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